TREK

COMMAND APPLICATIONS

TUTORIAL

November 2012

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FIGURES

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1   What You Need To Know Before You Read This Document

Before reading this document you should be familiar with the material in the TReK Getting Started Guide (TREK-USER-001) and the TReK Command Tutorial (TREK-USER-020). If you have not read these documents, you may have difficulty with some of the terminology and concepts presented in this document.

We assume you are an experienced Windows user. Information about how to use a mouse or how to use Windows is not addressed in this user guide. Please see your Windows documentation for help with Windows.

2   Technical Support

If you are having trouble installing the TReK software or using any of the TReK software applications, please try the following suggestions:

Read the appropriate material in the manual and/or on-line help.

Ensure that you are correctly following all instructions.

Checkout the TReK Web site at http://trek.msfc.nasa.gov/ for Frequently Asked Questions.

If you are still unable to resolve your difficulty, please contact us for technical assistance:

TReK Help Desk E-Mail, Phone & Fax:

E-Mail:	trek.help@nasa.gov
Telephone:	256-544-3521 (8:00 a.m. - 4:30 p.m. Central Time)
Fax:	256-544-9353

TReK Help Desk hours are 8:00 a.m. – 4:30 p.m. Central Time Monday through Friday. If you call the TReK Help Desk and you get a recording please leave a message and someone will return your call. E-mail is the preferred contact method for help. The e-mail message is automatically forwarded to the TReK developers and helps cut the response time.

3   Introduction

The purpose of this tutorial is to introduce you to the capabilities provided by the TReK Command Processing application. Since commanding involves a command session with the POIC, the Command Trainer application is used to simulate a POIC command session. During this tutorial you will use both of these applications to learn about TReK commanding capabilities.

The TReK Command Trainer application is a training tool. It can be used to "simulate" (and we use the word simulate here very loosely) a POIC command session when you cannot connect to the real POIC.

The TReK Command Processing application provides the capability to monitor and control all command processing activity on your TReK system. As discussed in the TReK Command Tutorial, a TReK system can perform a variety of commanding tasks. These include uplinking commands, updating commands, receiving and processing command responses, and displaying status information about each command destination. In addition to these capabilities, you can also view all command activity in realtime and record this activity to disk for later analysis. All command activity is on a per destination basis. In most cases you will probably be working with one destination at a time, but it is possible to configure TReK to work with multiple command destinations simultaneously. Other features include the ability to track all commands sent from your TReK system, the ability to modify command field calibrators, and a recorded data viewer that allows you to view all or specific portions of any command activity that you have recorded to disk.

4   Command Processing Main Window

The Command Processing main window consists of three main areas as shown in Figure 1. The top part of the main window contains a list of command destinations. Although you will probably only configure the application to communicate with one command destination at a time, it is possible to configure TReK to communicate with multiple destinations simultaneously. When you start the Command Processing application the list will be empty. This is because you have not yet added any destinations to the list. The columns in the destination list are configurable. Most of the columns display information about a POIC destination or TReK destination and are not applicable for Suitcase Simulator or PRCU destinations. So you may want to hide some of these columns when working with a Suitcase Simulator or PRCU destination. The middle part of the main window is referred to as the main window command track. This area is used to display the most recent commands sent from your TReK system. You can configure the list to display a specific number of commands.   Each row in command track shows the name of the command, the destination, the uplink time, and all the command responses received for that command. The Suitcase Simulator and PRCU systems do not send command responses, so when working with these types of destinations the command response columns will show "N/A". The bottom part of the window is a message area that is used to display important status and error information messages about the command processing activities in progress.
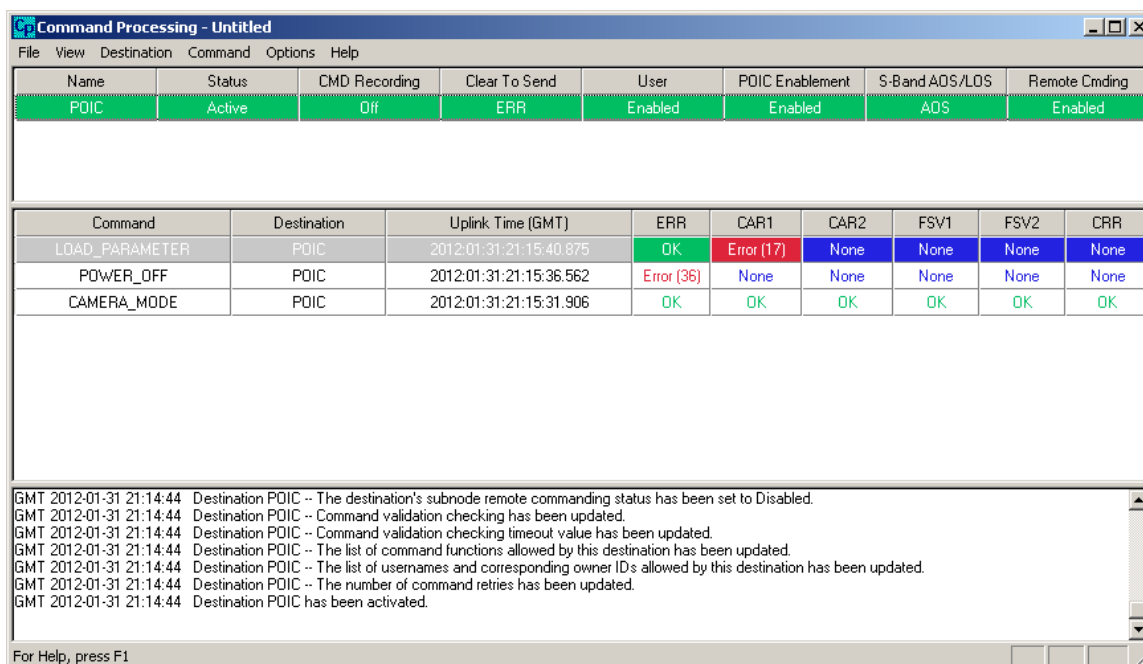
Figure 1 Command Processing Main Window

If you are running the Command Processing application or viewing this document from within Microsoft Word then you have probably noticed that colors are used in both the destination list and the command track list. These colors provide status information about the destinations and command responses. For example, when using the default colors, if the destination row is black, this indicates that the destination has not been activated. If the destination row is purple, this indicates that the destination is initializing. If the destination row is green, this indicates that the command destination has been activated and is ready to be used. In the command track list, green indicates a good command response and red indicates that there is an error associated with a command response. The colors are helpful in providing immediate information about the general configuration and status of each destination and command response displayed.

In Figure 1 there is a POIC destination in the list. This destination has been activated meaning that the TReK system is ready to send commands to the destination and receive command responses from the destination. The command track list shows three commands. The most recent command sent is the first command in the list. The oldest and first command that was sent was the CAMERA_MODE command. This command was successful. All command responses are OK and this is also indicated by the green color. The second command, POWER_OFF, was not successful. The ERR command response shows Error 36. This particular error occurred because the command was disabled at the POIC. When TReK requested to uplink this command the POIC rejected the uplink request since the command was disabled. The most recent command sent was the LOAD_PARAMETER command. This command was not successful. The CAR1 response shows Error 17 which indicates that the MCC-H uplink queue was full.

5 Command Trainer Main Window

The Command Trainer main window consists of two main areas as shown in Figure 2. The top part of the main window contains the list of trainers identified by your TReK system. When you start the Command Trainer application the list will be empty. This is because you have not yet added any trainers to the list. The bottom part of the window is a message area that is used to display important status and error information messages about the command trainer activities in progress.
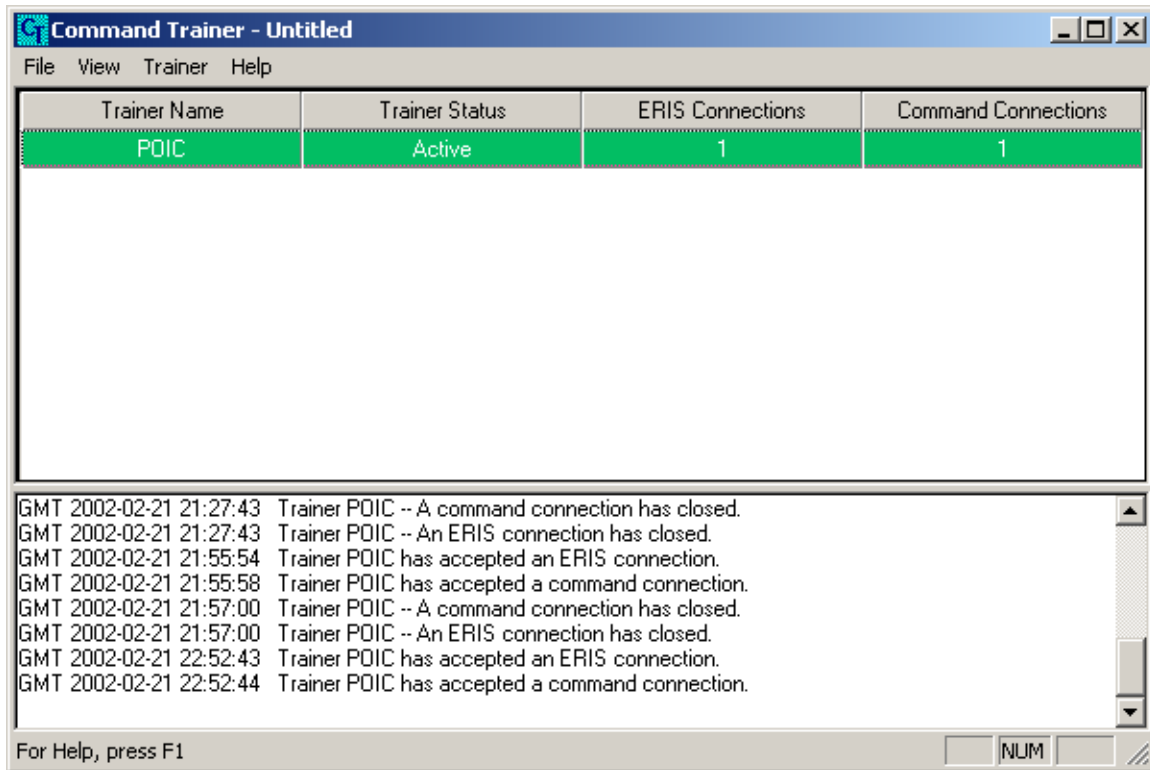
Figure 2 Command Trainer Main Window

There are four pieces of information that are displayed for each trainer in the trainer list. They are Trainer Name, Trainer Status, ERIS Connections and Command Connections. The Trainer Name identifies the trainer. The Trainer Status column identifies the status of the trainer. The ERIS and Command Connections shows how many ERIS and Command Connections are active.

In Figure 2 the trainer in the list is a POIC trainer. This trainer has been activated meaning that the TReK system is ready to provide command trainer support.

If you are running the Command Trainer application or viewing this document from within Microsoft Word then you have probably noticed that the trainer row has a color associated with it. The color provides information about the trainer. For example, when using the default colors, if the trainer row is black, this indicates that the trainer has not been activated. If the trainer row is purple, this indicates that the trainer is initializing. If the trainer row is green, this indicates that trainer is ready to provide support. The colors

are helpful in providing immediate information about the general configuration and status of each trainer in the list.

6 The Commanding Tour

The Commanding Tour introduces you to the main functions that you can perform using the Command Processing application by showing you an example for each one. The Command Trainer application is used to simulate an interface with the POIC so it also plays a key role in this tutorial. For details about an application please reference the application's user guide. Each section in the tutorial provides an introduction to a particular capability and provides a step-by-step example that demonstrates how to use the capability. Here are the topics that will be covered:

➢ How to Configure the Columns in the Main Window Destination List
➢ How to Set up your TReK System for Commanding
➢ How to Use the Realtime Viewers
➢ How to Uplink a Command and View Command Responses
➢ How to Update a Command
➢ How to Use the Recorded Data Viewer

This section was written assuming that you have read the Introduction section (section 3) the Command Processing Main Window section (section 4), and the Command Trainer Main Window section (section 5). If you have not read these sections, please go back and read them. They contain important information that is not repeated in this section.

Since this part of the document is more like a hands-on tutorial it is highly recommended that you print out section 6 so you have a paper copy to read while you work through each section.

Please go through the tour in order. Some sections depend on data from previous sections.

How to Configure the Columns in the Main Window Destination List

6.1   How to Configure the Columns in the Main Window Destination List

This section will show you how to configure the columns in the main window destination list. There is quite a bit of information that can be displayed in this area.

Step-By-Step

1. Start the Command Processing application by using the Window's **Start** menu. Go to the Window's **Start** menu, select **Programs**, select **TReK**, and then select **Command Processing.**   (Note: If you selected a Program Folder name other than **TReK** during installation, then that name will appear on the Start menu instead of TReK). The **Command Processing** main window as shown in Figure 3 will appear on your screen.
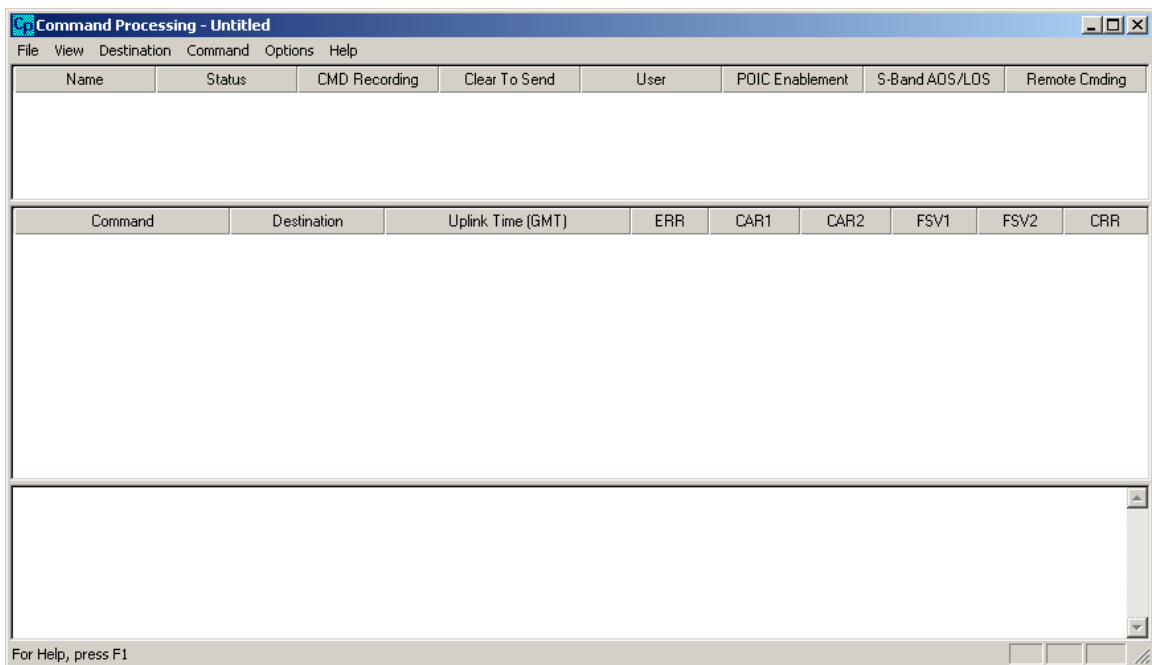
Figure 3 Command Processing Main Window

2. Go to the **View** menu and select the **Configure Destination List Columns** menu item. The dialog shown in Figure 4 is displayed.

7
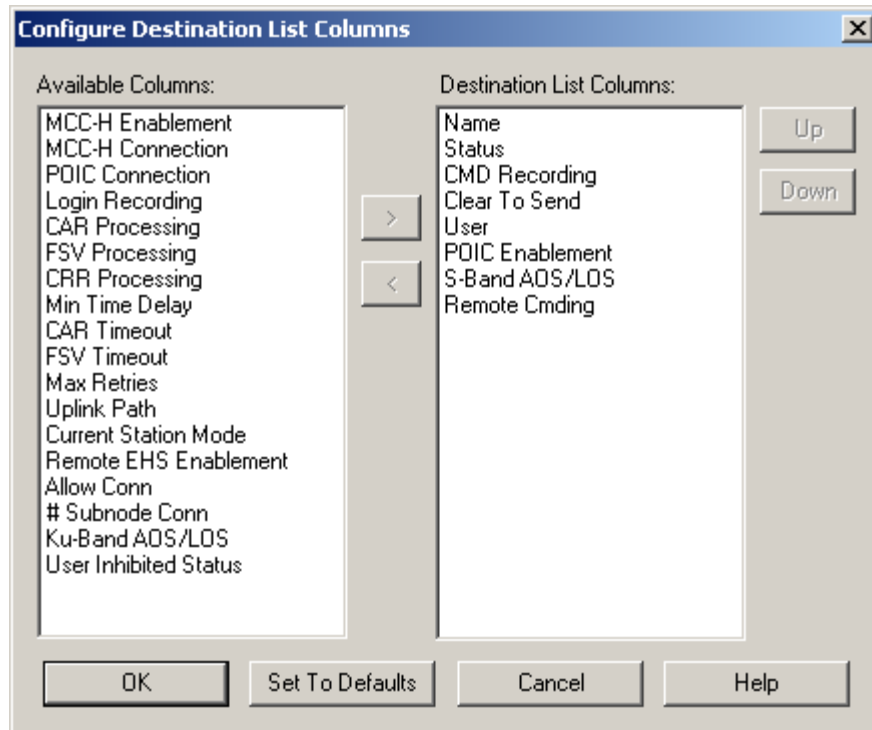
Figure 4 Configure Destination List Columns

3. The items in the Available Columns list show information that is not currently being displayed. The Destination List Columns list shows the information that is being displayed. The arrow keys in the middle can be used to transfer information from one list to the other. In the next section we are going to be working with Login Recording. Therefore, let's move that item from the Available Columns list to the Destination List Columns list so that it will be displayed. In the Available Columns list click on the Login Recording item (4th item in the list). Once it is selected push the > button to move it to the Destination List Columns list. The dialog should now look like Figure 5.

8
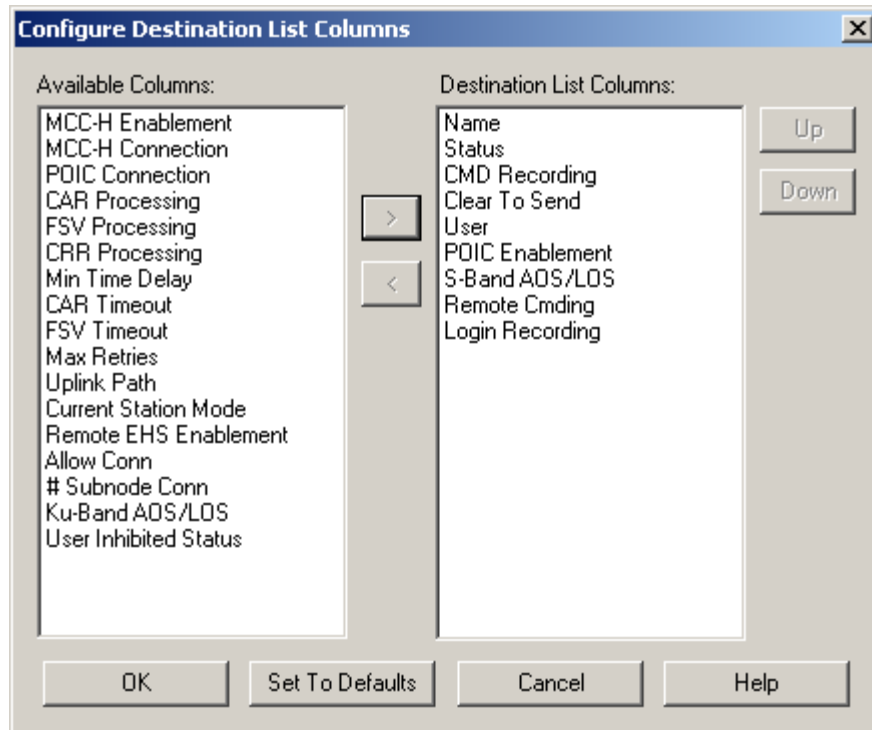
Figure 5 Login Recording Move to Destination List Columns List

4. Push the **OK** button to close the dialog. Now take a look at the Command Processing main window. As you can see in Figure 6 the Login Recording Column has now been added. You can resize your window horizontally to make it a little wider if some of the column names are not completely visible.
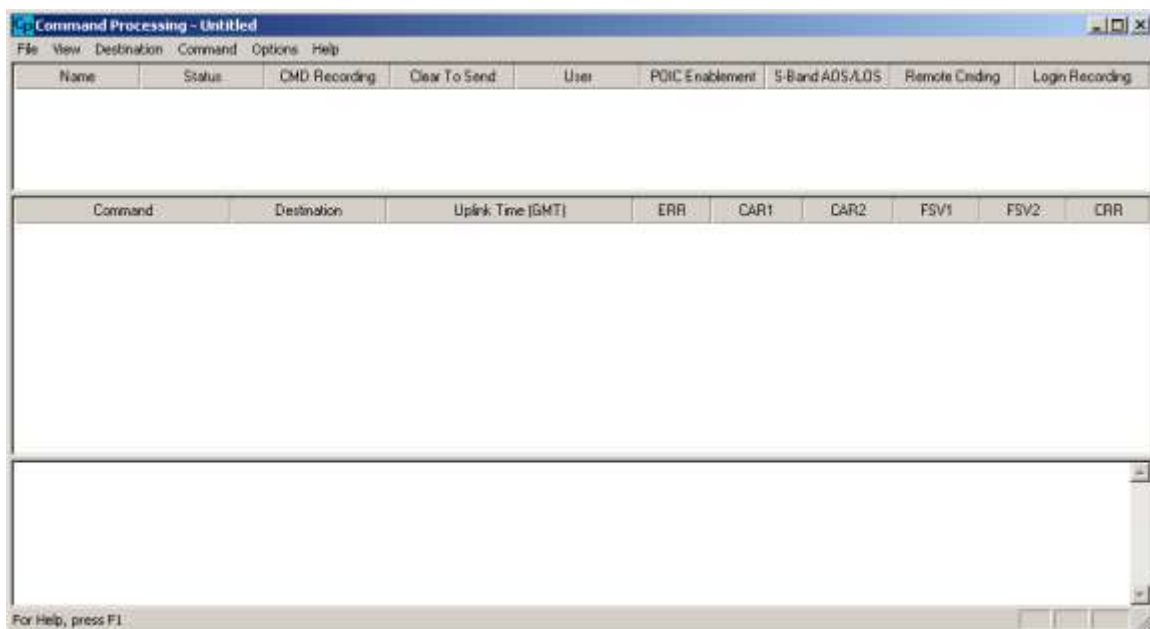
Figure 6 Command Processing with Login Recording Column

How to Set up your TReK System for Commanding

6.2   How to Set up your TReK System for Commanding

This section will show you how to establish a POIC destination. If you went through the Commanding Tour in the Getting Started Guide, this section is very similar to that tour except it provides more detail. In this example, we will start where we ended in the example above. If you have not performed the Step-By-Step procedure in section 6.1 please go back and do this before performing the steps below.

Step-By-Step

The first step we need to perform is to establish a POIC destination (this is how we create a commanding connection with the POIC). When you establish a command connection with the POIC you will actually be creating two network connections. One network connection will be with the EHS Remote Interface System (ERIS) and the other is with the POIC command system.   The Add POIC Destination dialog is used to enter all the information needed to establish both network connections. Go to the Destination menu and select the Add POIC Destination menu item.

However, before we actually perform this step please read the following information about each of the tabs in the Add POIC Destination dialog.

Add POIC Destination Dialog (General Tab)
The Add POIC Destination dialog is shown in Figure 7. This dialog is used to add a POIC Destination to the destination list in the main window. This is how you tell your TReK system the information it needs to establish a command connection with the POIC. There are four tabs in the Add POIC Destination dialog (when adding a destination).

Figure 7 Add POIC Destination (General Tab) Dialog

Each field on the General Tab of the Add POIC destination dialog is described below.

Name
This is the name of the destination. This name must be unique among all destinations and login sessions.

Database (Required Field)
The database field is used to tell your TReK system which database to use when gathering command information.   The database field must contain the complete directory path and name for your database. An example of this is
`c:\TReK\command_database\CommandDatabase.mdb`. If you don't know the complete path, you can push the Browse… button located to the right of the Database field. This will bring up a Windows Open dialog box that you can use to search local directories to find your database file. The Open dialog is not described in this document since it is a typical Windows dialog box. If you need help with this dialog, please refer to the Windows on-line help. The Open dialog will default to the `<base_path>\database` directory. The <base_path> for a Windows 2000 system is:

<base_path> = C:\Documents and Settings\<username>\Application Data\TReK

You can save your database files anywhere you like, but this default directory provides an easy way for you to keep up with your database files.

Local IP Address   (Required Field)
The Local IP address field is used when establishing a connection with the POIC. This should be the IP address that you told the POIC you would use for commanding. Remember that for security reasons the POIC will only connect to a known IP address. Therefore, they should already have this IP address.

If you are working with the TReK Command Trainer application, and your machine does not have network connectivity (such as no ethernet card or modem or the system is not connected to a network), set the IP address to 127.0.0.1. This is called a loopback address and can be used while you are working in standalone mode.

Local Port (Required Field)
The Local Port is used to tell your TReK system which port to use when establishing a connection with the POIC.

Firewall In Use (Required Field)
The Firewall In Use checkbox is used to tell your TReK system that your PC is located behind a firewall that is using Network Address Translation. If this is the case you will need to enter your firewall's public IP Address and port number.

Firewall IP Address (Required Field if Firewall In Use is Checked)
The IP address for your firewall.

Firewall Port Number Required Field if Firewall In Use is Checked)
The port number for your firewall.

Destination Configuration   (Required Field)
The Destination Configuration provides a way to configure destination blocking and other destination properties. Each is described below:

> Blocking/Non-Blocking - If the destination is configured as a Blocking destination, and you request to uplink a command to this destination TReK will not attempt to send the command until the destination is "Clear To Send". This means that the Command API function will block and wait until it is clear to send another command uplink request before proceeding. The amount of time in a blocked state depends on the number of commands already waiting when the request is made. If the destination is configured as Non-Blocking, and you request to uplink a command to this destination, TReK will place the command in a queue to be uplinked when the destination is "Clear To Send". The Command API function call will return after the command is placed in the queue.

User Enabled - If you request to uplink a command to this destination, TReK will only attempt to send it if the POIC status shows that you are enabled for commanding.

POIC Enabled - If you request to uplink a command to this destination, TReK will only attempt to uplink the command if the POIC status shows that the POIC is enabled for commanding.

MCC-H Enabled - If you request to uplink a command to this destination, TReK will only attempt to uplink the command if the POIC status shows that the MCC-H is enabled for commanding.

Remote Commanding Enabled - If you request to uplink a command to this destination, TReK will only attempt to uplink the command if the POIC Status shows that Remote Commanding is enabled. (Note: Remote Commanding is also referred to as Non-EHS Commanding).

Valid Mnemonic - If you request to uplink a command to this destination, TReK will only attempt to uplink the command if the POIC shows that this command mnemonic is enabled.

Note: If the check for Valid Mnemonic is performed on a Non-Blocking Destination and the mnemonic provided by the user is invalid, the destination will hang (i.e., it keeps checking to see if the mnemonic is valid). It is suggested that you do not use the Valid Mnemonic check for Non-Blocking destinations. If this occurs operationally, just change the destination's properties to not check for invalid mnemonics.

Acquisition of Signal -- If you request to uplink a command to this destination, TReK will only attempt to uplink the command if the POIC shows Acquisition of Signal (AOS).

Number of Command Retries (Required Field)
This value indicates how many times the POIC should attempt to retry a command uplink. The POIC is configured with an overall maximum number of command retries. The value you enter cannot exceed this maximum. The POIC's "Max Retries" value is returned when the destination is activated. You can see this value in the Command Processing main window (if you add this column) or in the POIC Destination Properties dialog (Configuration Tab). Since the POIC's "Max Retries" value is configurable, it's possible it may change. If the POIC changes their "Max Retries" value to a value that is less than the value you are using, your value will automatically be reset to match the POIC's value. If this occurs, you will be notified via a message in the Command Processing main window message area.

Add POIC Destination (Login Tab) Dialog

The Login Tab, shown in Figure 8, provides a way to identify an ERIS Login session to use with this POIC Destination. It is possible to share an ERIS Login Session among several POIC Destinations. When the POIC Destination is activated, it will activate the ERIS Login Session if it is inactive or use the active ERIS Login Session if it is already active. To add an ERIS Login Session to the list, push the Add button. Once an ERIS Login Session is in the list, it can be modified using the Modify button. If an ERIS Login Session is in the list and is inactive, it can be deleted using the Delete button.
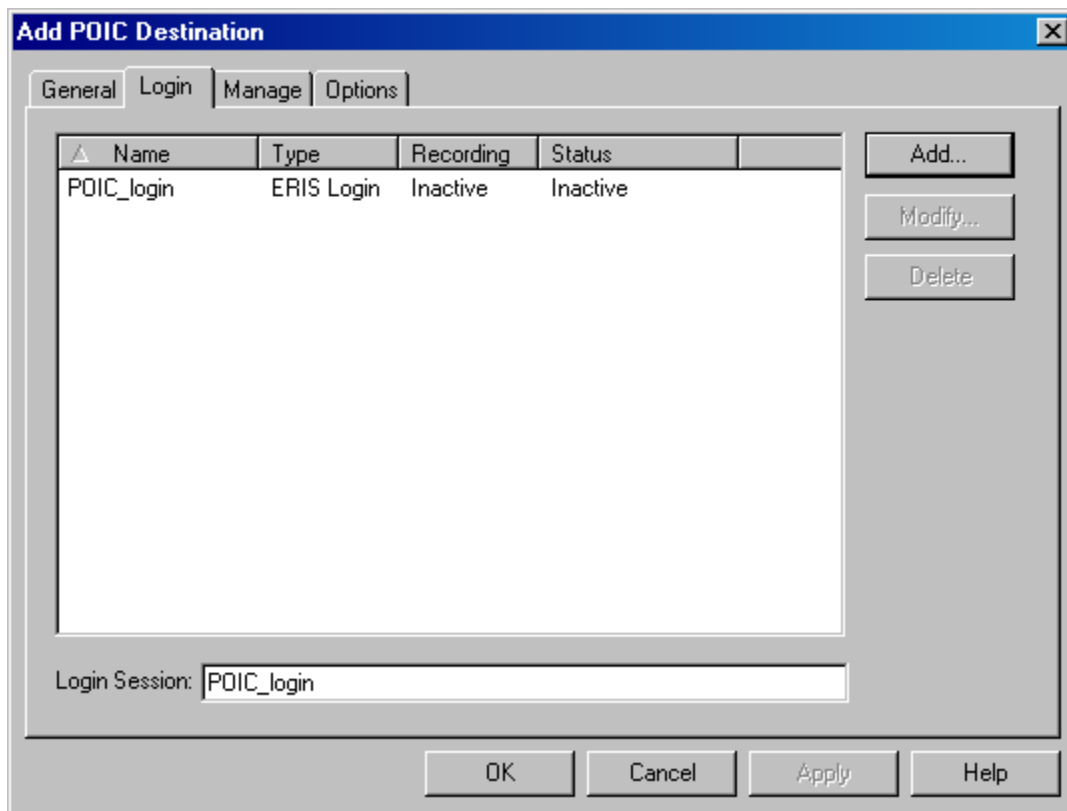

Figure 8 Add POIC Destination (ERIS Tab) Dialog

Note: When you select to Modify an ERIS Login Session, the name of the ERIS Login Session cannot be modified (regardless of whether the ERIS Login Session is active or inactive). If you need to change the name, you will need to add a new ERIS Login Session. The old ERIS Login Session will be considered "in use" until you leave the dialog. Therefore, if you want to delete it you need to delete it after you leave this dialog.

Note2: All the ERIS Login Session list changes you make on this tab take place immediately and cannot be cancelled. The only item on this tab that can be cancelled is the ERIS Login Session to be used by this destination. If you push the Cancel button to cancel all the actions taken in the dialog, the ERIS Login Session assignment will be reset but the ERIS Login Sessions added, modified, or deleted will not be cancelled or reset.

Add ERIS Login Session (General Tab) Dialog
The Add ERIS Login Session dialog is shown in Figure 9. This dialog is used to Add an
ERIS Login Session to the ERIS Login Session list in the Login Tab of the Add POIC
Destination dialog. It has a General tab and an Options tab.

Figure 9 Add ERIS Login Session (General Tab) Dialog

Each field and control on the Add ERIS Login Session (General Tab) dialog is described
below.

Name
This is the name of the ERIS Login Session. This name must be unique among all
destinations and login sessions.

POIC Host Name
When entering information needed to establish a connection with the POIC you can enter
the POIC Host Name or the POIC IP Address. The POIC Host Name menu lists all the
available POIC host names. When you select a host name, the IP Address in the POIC IP
Address field will not be updated until the destination is activated.

POIC IP Address
The IP Address to connect to at the POIC.

POIC Port
The Port Number to use when connecting to the POIC. This should be provided to you
by the POIC.

<u>Username</u>
The username for your POIC Account. This should be provided to you by the POIC. If you leave this field blank you will be prompted to enter this information when you activate this destination. (During the activation sequence when TReK is establishing a connection with the POIC, ERIS will prompt you to log in to your POIC account).

<u>Password</u>
The password for your POIC Account. This should be provided to you by the POIC. If you save your configuration, the password will not be saved in the configuration file. This has been done for security reasons.

<u>MOP</u>
The Mission/Operational Support Mode/Project (MOP) to log into when you log into your POIC account. If you don't know the MOP then just leave this field blank. If you leave this field blank you will be prompted to select a MOP from a list during the Log In sequence. If you enter a MOP into this field then the application will try to use the MOP you enter and will only prompt you if the MOP you entered is not available. If you log into a POIC account in which there is only one mop available, then the POIC will automatically log you into that MOP. In this case, the POIC does not send a MOP request to TReK.

Add ERIS Login Session (Options Tab) Dialog
The Add ERIS Login Session Options Tab is shown in Figure 10. This tab is used to configure recording and viewing properties for the ERIS Login Session.
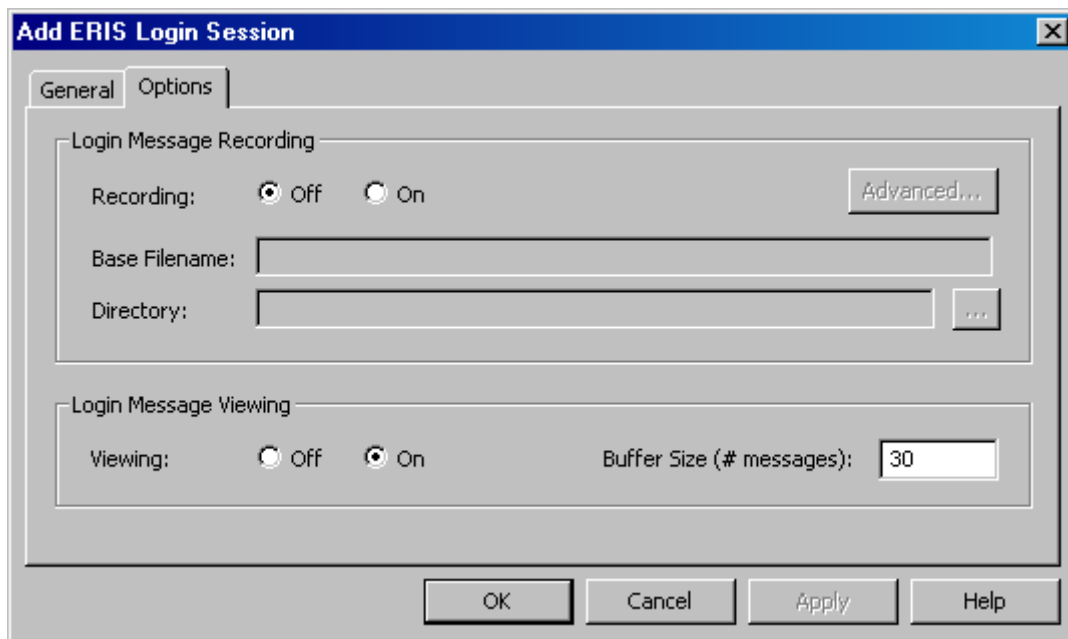

Figure 10 Add ERIS Login Session (Options Tab) Dialog

Each field and control on the Add ERIS Login Session (Options Tab) dialog is described below.

Recording (Required Field)
The Recording option is used to tell your TReK system whether the ERIS Login Session should be recorded. In the main window the recording status for this recording will be labeled "Login Recording". The Login Recording status is not shown in the default main window configuration. By using the 'Configure Destination List Columns' menu option on the View menu you can add this column to the main window list.

Base Filename (Required Field if Recording is On)
When your TReK system records an ERIS Login Session, the raw data is stored in one or more files in a local directory. A base filename (provided by you) is used as the base name of the file and the rest of the file name is generated by your TReK system. The complete filename indicates the time the file was created and closed. When you want to play the data back, you will be asked to provide this Base Filename. Therefore, you should try to select a meaningful name that will be easy to remember and is closely associated with the data that you are recording.

Directory (Required Field if Recording is On)
The Directory information is used to tell your TReK system which directory should be used when storing your data recording files. When you want to play the data back, you will be asked to provide this Directory information so your TReK system can find the files. This field requires a complete directory path. An example of this is `c:\MyRecordingFiles\`. If you don't like to type or you need help defining the complete path, you can push the … (dot dot dot) button located to the right of the Directory field. This will bring up a Windows Browse for Folder dialog which you can use to identify the local directory path where you want to store your recorded data files. The Browse for Folder dialog is not described in this document since it is a typical Windows dialog box. If you need help with this dialog, please refer to your Windows on-line help.

Viewing (Required Field)
The Viewing option is used to tell your TReK system whether the realtime messages associated with the ERIS Login Session should be available for viewing. Viewing does use CPU and memory resources. Therefore, remember that if you start to run low on resources it is possible to turn viewing off.

Buffer Size (# Messages) (Required if Viewing is On)
The Buffer Size tells your TReK system how many realtime messages to store in memory at a time. The buffer will wrap and older messages will be overwritten. This is a safeguard against using up too much memory.

Add POIC Destination (Manage Tab) Dialog

The Manage tab, shown in Figure 11, is used to configure the destination so it can be used by remote users. This capability is not going to be covered in this document. It is part of TReK's command management capability which is covered in the Command Management Tutorial (TREK-USER-036).

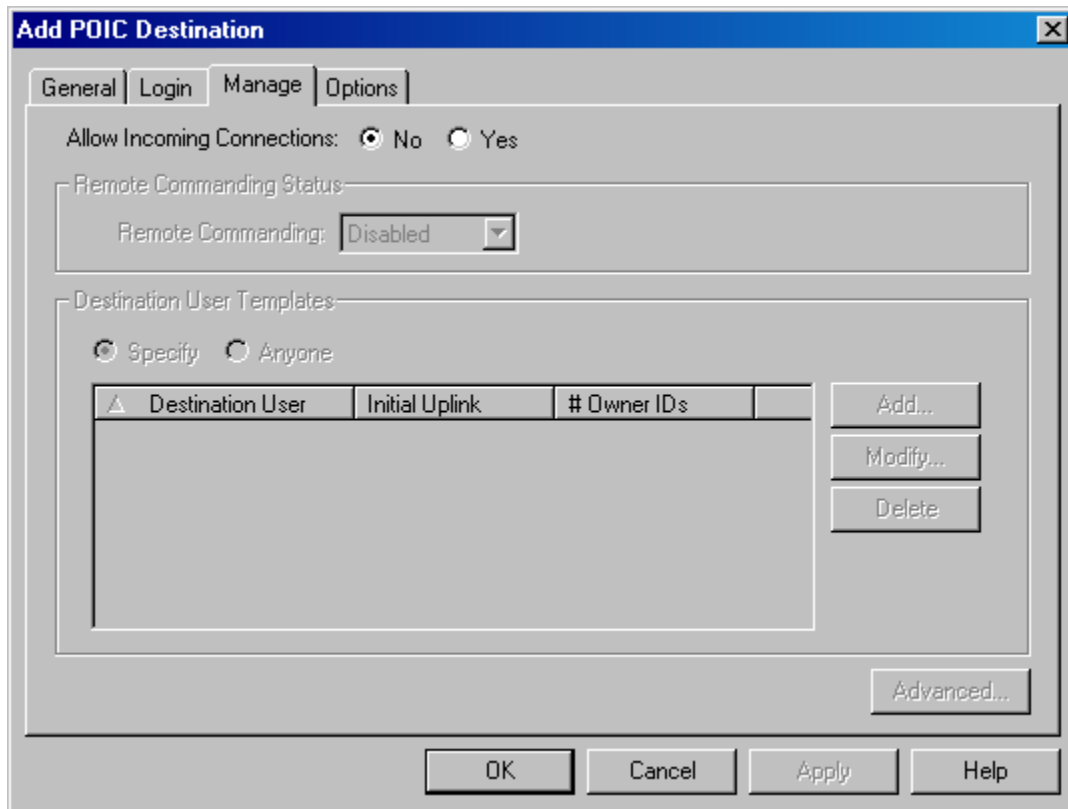**Figure 11 Add POIC Destination (Manage Tab) Dialog**

Add POIC Destination (Options Tab) Dialog

The Options tab, shown in Figure 12, is used to enter command message recording and command message viewing information for the POIC Destination.
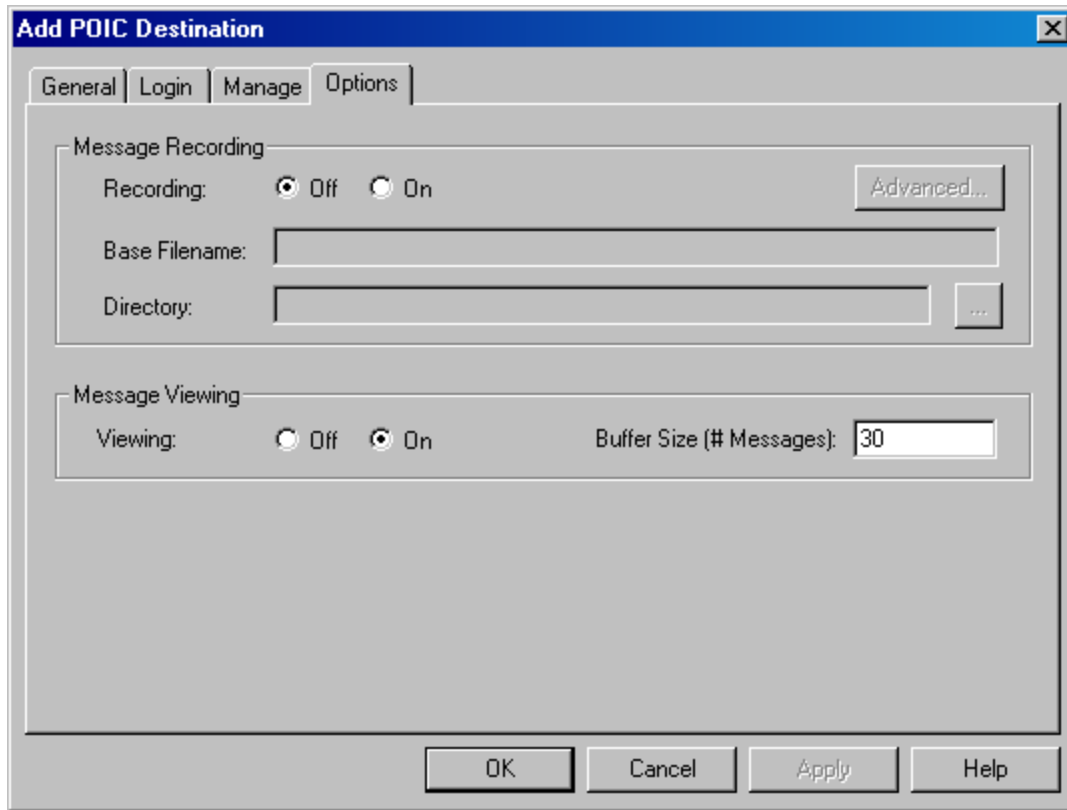
Figure 12 Add POIC Destination (Options Tab) Dialog

Each field on the Options Tab of the Add POIC destination dialog is described below.

Recording (Required Field)
The Recording option is used to tell your TReK system whether the commanding session should be recorded. This is the connection with the POIC that is used to send commands, receive responses, etc. In the main window the recording status for this recording will be labeled "CMD Recording". Please be aware that recording data can take up a large amount of disk space. Make sure you have enough space to hold all the data recording files.

Base Filename (Required Field if Recording is On)
When your TReK system records a commanding session, the raw data is stored in one or more files in a local directory. A base filename (provided by you) is used as the base name of the file and the rest of the file name is generated by your TReK system. The complete filename indicates the time the file was created and closed. When you want to play the data back, you will be asked to provide this Base Filename. Therefore, you should try to select a meaningful name that will be easy to remember and is closely associated with the data that you are recording.

Directory (Required Field if Recording is On)
The Directory information is used to tell your TReK system which directory should be used when storing your data recording files. When you want to play the data back, you will be asked to provide this Directory information so your TReK system can find the files. This field requires a complete directory path. An example of this is `c:\MyRecordingFiles\`. If you don't like to type or you need help defining the complete path, you can push the … (dot dot dot) button located to the right of the Directory field. This will bring up a Windows Browse for Folder dialog which you can use to identify the local directory path where you want to store your recorded data files. The Browse for Folder dialog is not described in this document since it is a typical Windows dialog box. If you need help with this dialog, please refer to your Windows on-line help.

Viewing (Required Field)
The Viewing option is used to tell your TReK system whether the realtime messages associated with the commanding session should be available for viewing. Viewing does use CPU and memory resources. Therefore, remember that if you start to run low on resources it is possible to turn viewing off.

Buffer Size (# Messages) (Required if Viewing is On)
The Buffer Size tells your TReK system how many realtime messages to store in memory at a time. The buffer will wrap and older messages will be overwritten. This is a safeguard to guard against using up too much memory.

Important Note: Don't get confused between ERIS Login Recording and Commanding Recording. Remember that to communicate with the POIC, TReK has to establish two different connections with the POIC. One is an ERIS connection and one is a commanding connection. Since these are two different connections, it is possible to specify different recording preferences for each connection. That's why you have ERIS Login Recording and Commanding Recording. This is also true for Viewing realtime messages. There are realtime ERIS messages and realtime commanding messages. For more information please reference the TReK Commanding Tutorial and/or the POIC to Generic User Interface Defintion Document (SSP-50305).

Now we can continue with the tutorial …..

1. Go to the Command Processing **Destination** menu and select **Add POIC Destination**. The **Add POIC Destination** dialog shown in Figure 13 will appear.

Figure 13 Add POIC Destination Dialog

2. In the Add POIC Destination (General Tab) dialog enter the following information:

   Database: <Full Path>\CommandDatabase.mdb
                             Hint: Don't forget to enter the full directory path. The
                             Browse button provides a way to select the database and
                             will fill in the full directory path for you.

   The Local IP Address should have defaulted to your local IP address. If it didn't
   please update this field with a valid local IP address. [If you are working on a
   computer that doesn't have a network card please enter the loopback address
   (127.0.0.1)]. There is no need to change any of the default data in the other fields
   on this tab. Now we need to enter the information needed to establish the ERIS
   network connection. Please select the **Login** tab. You should see the tab shown
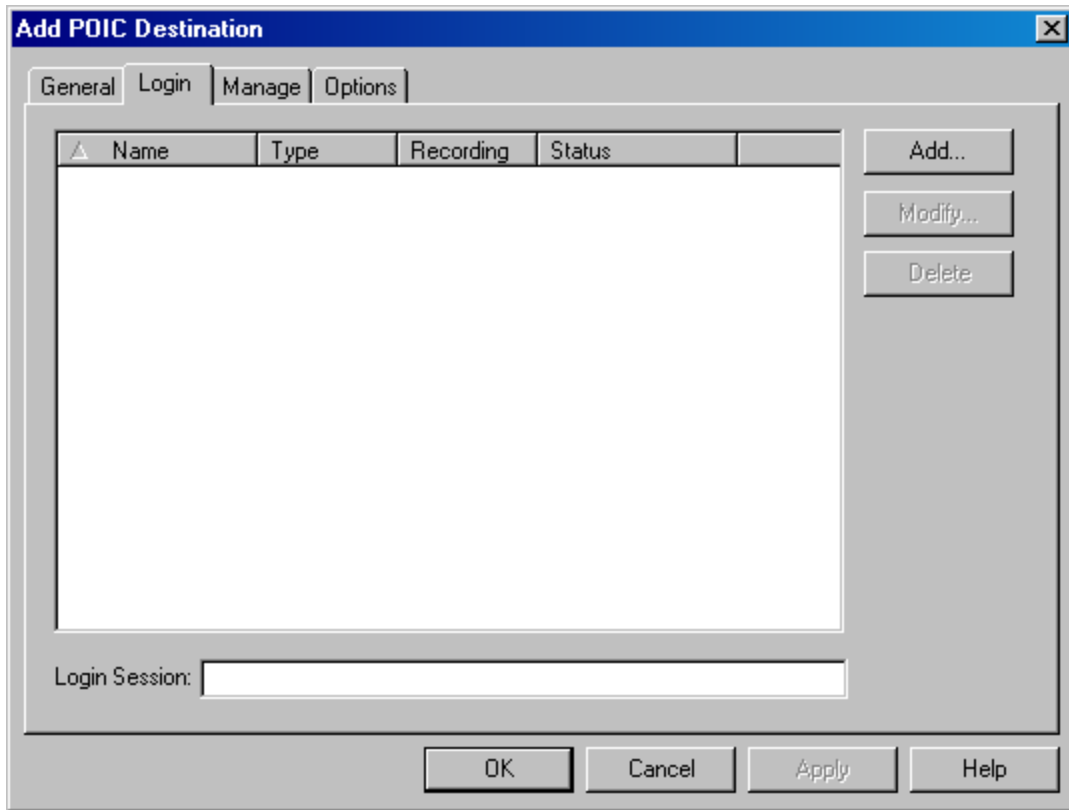   in Figure 14.

Figure 14 Add POIC Destination (ERIS Tab) Dialog

3. In the Add POIC Destination (Login Tab) dialog push the Add button. The dialog shown in Figure 15 should appear.

Figure 15 Add ERIS Login Session Dialog

4. In the Add ERIS Login Session (General Tab) dialog enter the following information:

POIC IP Address: Enter your Local IP Address in this field. This information is going to be used to connect to the POIC. However, in this situation the POIC is going to be simulated by the Command Trainer application which is going to be running locally on your computer. Therefore, we need to enter the local IP address that will be used by the Command Trainer application instead of the real POIC IP Address. Please note both the POIC IP Address and POIC Port Number that you have entered in this dialog. You will need to verify that you are using the same IP Address and Port Number on the Command Trainer side when we get to that part of the tutorial.

5. Move to the Options Tab. In the Add ERIS Login Session Options Tab enter the following information:

Recording: Push the On button so the ERIS Login session will be recorded.

Base Filename: eris

Directory: Select a directory to store the eris login recording file.

Please remember the location of the eris login recording file. We will be using
this file when we get to section 6.6 on the Recorded Data Viewer.

There is no need to change any of the other default data in the other fields on this tab.

Push the **OK** button to close the Add POIC Destination dialog.

At this point you should see the POIC destination in the Command Processing main
window destination list as shown in Figure 16.
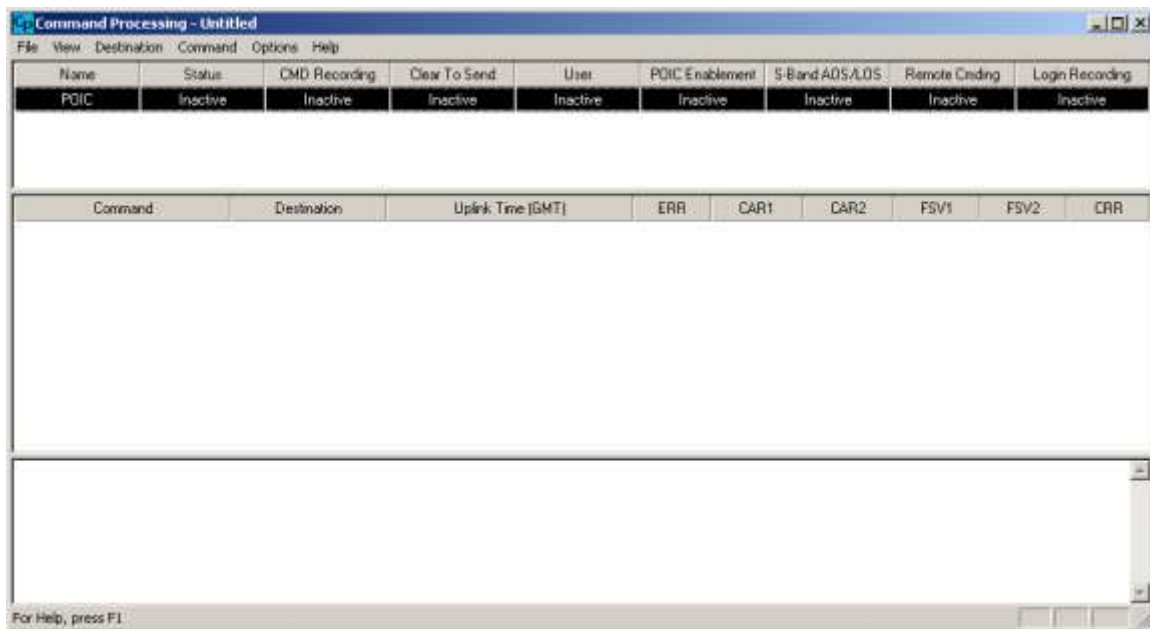
Figure 16 Command Processing with POIC Destination in Destination List

Now we need to start the **Command Trainer** application that will simulate the POIC.

You can start the Command Trainer application by using the Window's **Start** menu.
From the **Start** menu select **Programs**, select **TReK**, and then select **Command
Trainer.**   (Note: If you selected a Program Folder name other than **TReK** during
installation, then that name will appear on the Start menu instead of TReK). The
Command Trainer main window as shown in Figure 17 will appear on your screen.

Figure 17 Command Trainer Main Window

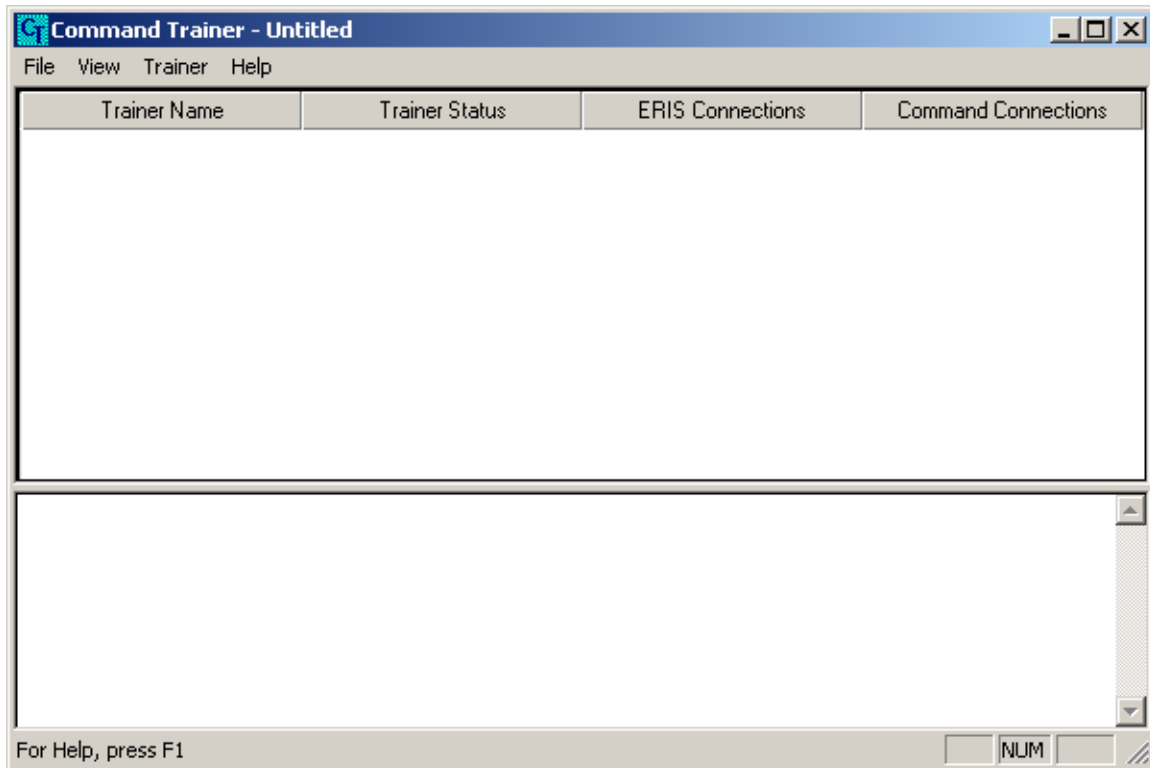6. Go to the **Trainer** menu and select **Add POIC Trainer**. The **Add POIC Trainer** dialog as shown in Figure 18 will appear.
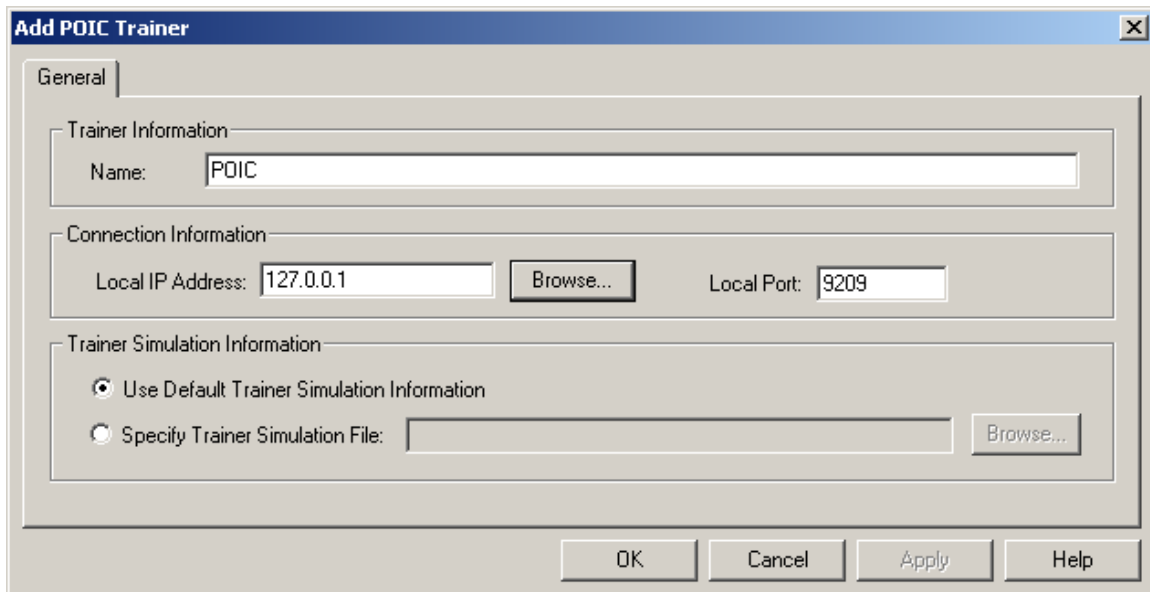

Figure 18 Add POIC Trainer Dialog

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7. In the **Add POIC Trainer** dialog make sure the **Local IP Address** is the same address that you entered for the POIC Address on the ERIS tab in the Add POIC Destination dialog. Also make sure the Local Port is the same as the POIC Port number. These two addresses and port numbers must match. The Command Processing application is going to establish a Transmission Control Protocol (TCP) network connection with the Command Trainer application and this is the IP address that will be used for that connection.

    When you are done checking (and possibly updating) this information push the **OK** button. You should now see the trainer listed in the Command Trainer main window trainer list as shown in Figure 19.
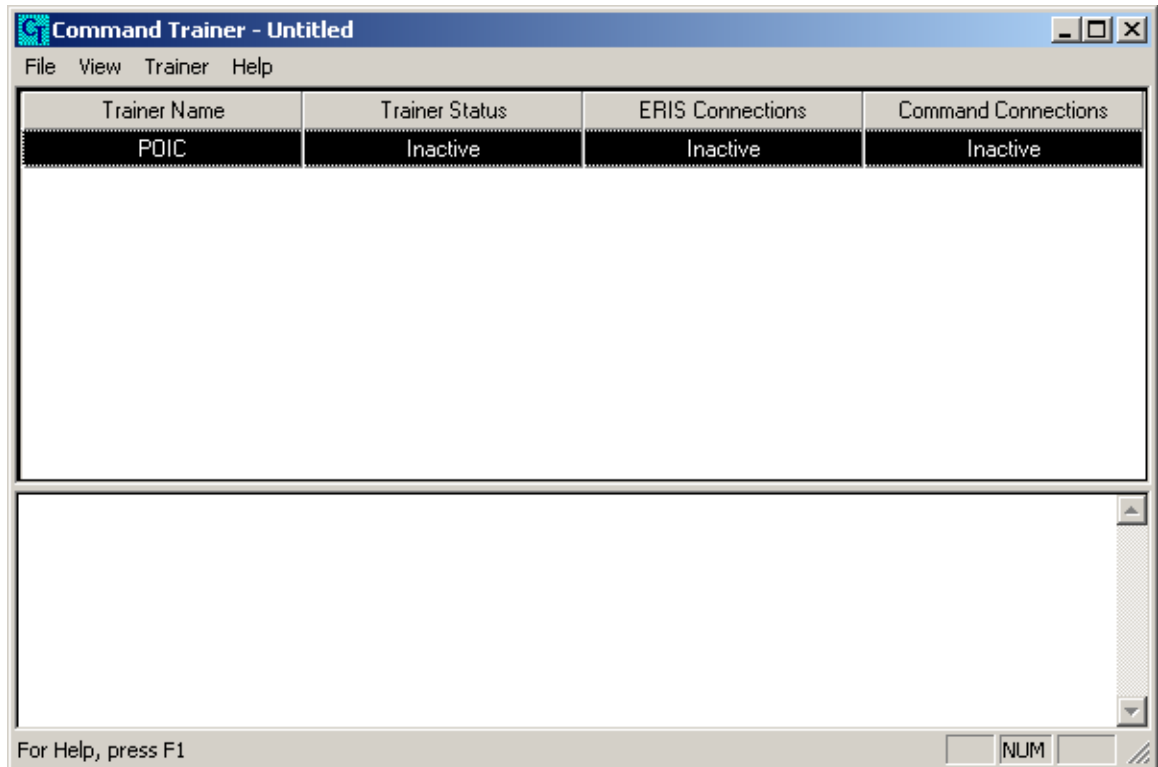
Figure 19 Command Trainer with POIC Trainer in Trainer List

8. Select the POIC trainer in the Command Trainer application's main window trainer list. The row should be highlighted (as shown in Figure 19). Now go to the **Trainer** menu and select **Activate Trainer**. You will see the color of the trainer change to green and a message in the message area of the main window indicating that the trainer has been activated. Notice that the ERIS Connections and Command Connections columns show 0. This is because at this point no connections have been established.

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9. Now go to the Command Processing application. **Select** the POIC destination in the Command Processing application's main window destination list. The row should be highlighted. Go to the **Destination** menu in the Command Processing application and select **Activate Destination**. You will see the color of the destination change to purple and the status change to initializing. You will also be prompted with the ERIS Login dialog shown in Figure 20.

Note: When actually connecting to the POIC the procedure will be slightly different than what you see when working with the TReK Command Trainer. First you will have to establish a VPN session when connecting to the POIC. Second, during the login sequence you will be prompted to accept a government computer warning banner.
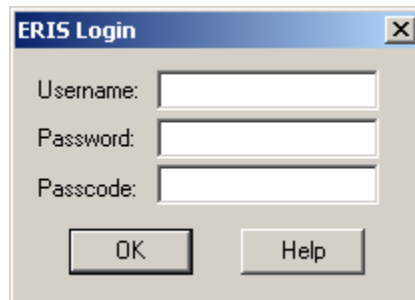
Figure 20 ERIS Login Dialog

10. In the **ERIS Login** dialog enter the following information and push the **OK** button:

Username:	captain
Password:	kirk
Passcode:	12345678

At this point you will be prompted with the **Select Role** dialog shown in Figure 21 Just push the **OK** button (this will accept the default Role that is highlighted).
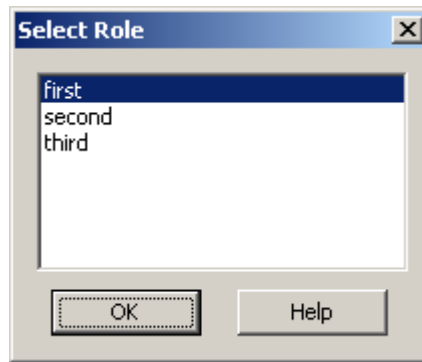
Figure 21 Select Role Dialog

Next you will be prompted with the **Select MOP** dialog shown in Figure 22. Just push the **OK** button (this will accept the default MOP that is highlighted).
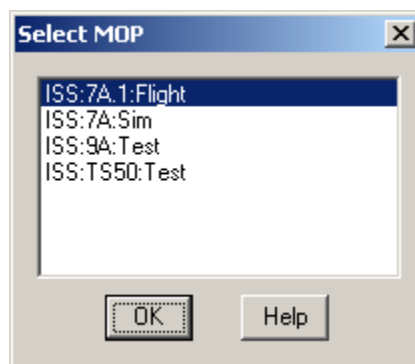
Figure 22 Select MOP Dialog

The POIC destination should turn green and should look like Figure 23. The green color indicates that you have now established both network connections with the POIC (with the Command Trainer in this case).   Notice that the ERIS Recording column shows "Recording". This indicates that the ERIS Session is being recorded to disk. Notice that the Command Trainer application is now showing one ERIS connection and one Command Connection.

Note: If something went wrong and the destination failed to activate, chances are it's because there is an IP address or port number mismatch.

Note2: Once you select the MOP, Command Processing will activate very quickly. When you connect to the POIC instead of the Command Trainer, there may be a noticeable delay after the MOP is selected until the destination is activated (green). You can look at the message area to see the progress of the activation.
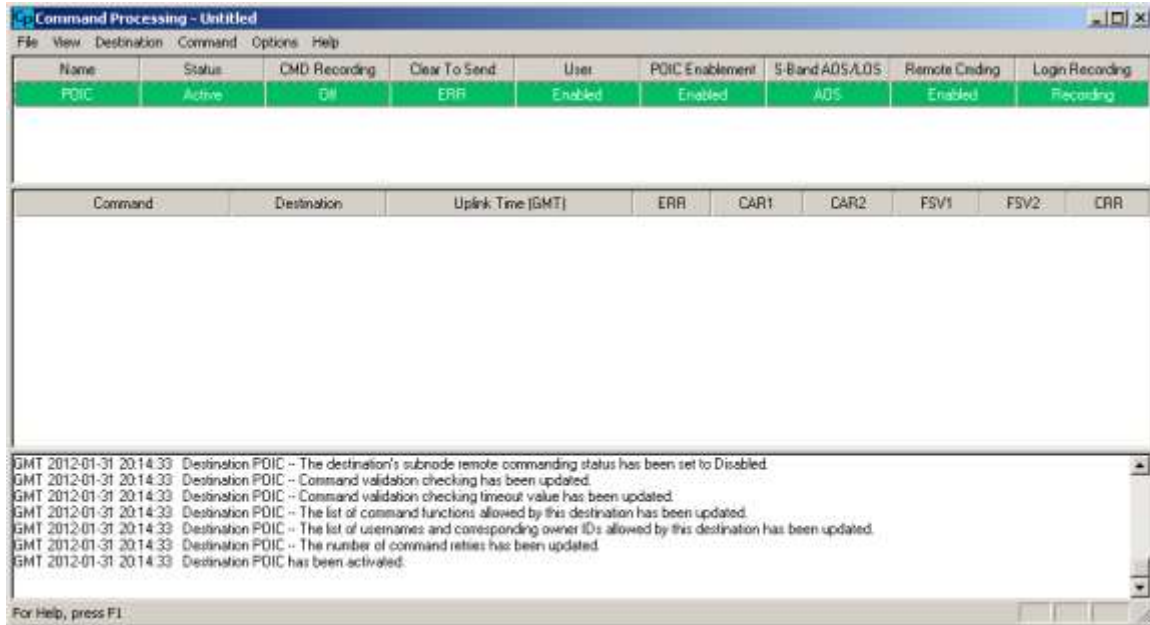
Figure 23 Active POIC Destination

11. Now that we have captured some ERIS login messages lets turn off Login Message Recording. Select the POIC Destination in the destination list. While you have the destination selected, use the right mouse button to activate the pop-up menu. On the pop-up menu select the **Stop Login Recording** menu item. This will turn off Login Recording. (Note: You can also turn off Login Recording by using the Destination Properties dialog. Please reference the Command Processing User Guide for more information).

Take a look at the Login Recording column in the main window. This column should show "Stopped" to indicate that Login Recording has been stopped. This is shown in Figure 24.

Figure 24 Login Recording Stopped

You're now ready to perform a variety of commanding functions. Let's move on to the next topic – How to Use the Realtime Viewers.

How to Use the Realtime Viewers

6.3 How to Use the Realtime Viewers

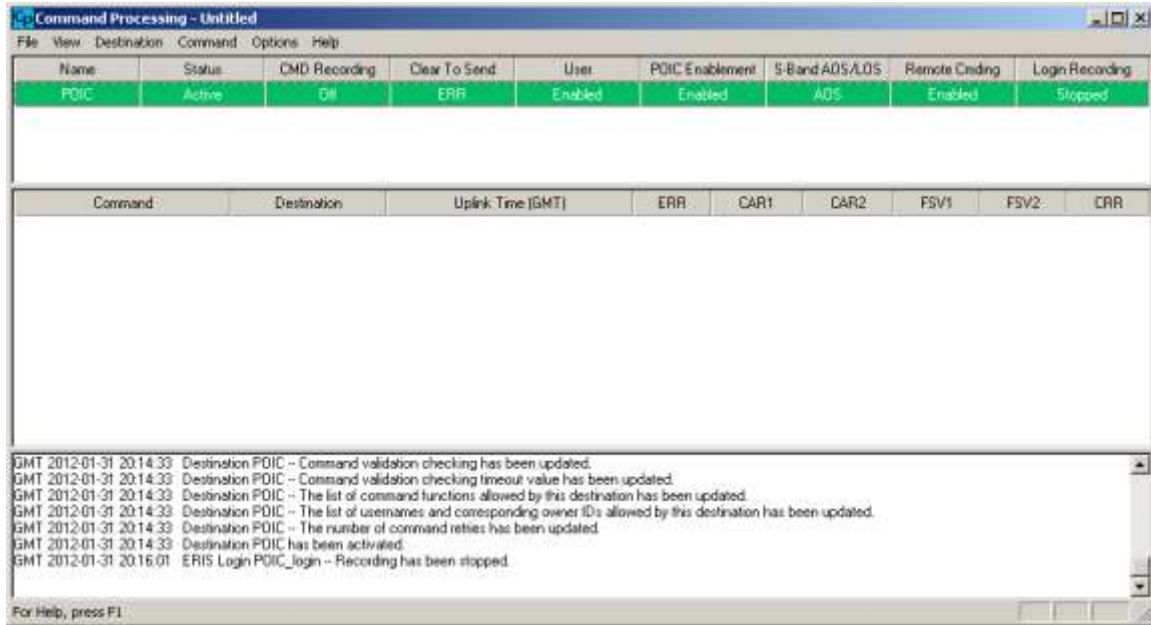This section will show you how to view realtime login messages and realtime commanding messages as they are exchanged between TReK and the POIC. The viewers are helpful if you need to see exactly what data was transmitted between TReK and ERIS and between TReK and the POIC command system. In this example, we will start where we ended in the example above. If you have not performed the Step-By-Step procedure in section 6.2 please go back and do this before performing the steps below.

Step-By-Step

1. Select the POIC destination in the Command Processing main window destination list.

2. Go to the **Destination** menu, and select the **View Realtime Login Messages** menu item. The dialog in Figure 25 is displayed.

Figure 25 View Realtime Login Messages Dialog

This dialog displays the latest realtime login messages that were exchanged between TReK and ERIS. You can use the scrollbar to scroll through the messages to see the login sequence you went through as well as TReK's request to start a command session.

3. Now go to the **Destination** menu and select the **View Realtime Commanding Messages** menu item. The dialog shown in Figure 26 is displayed.
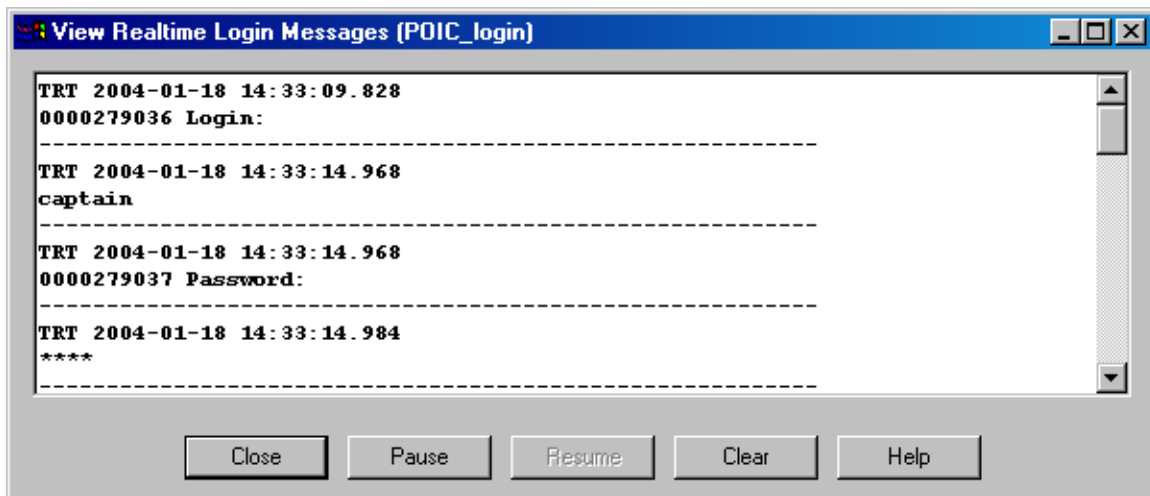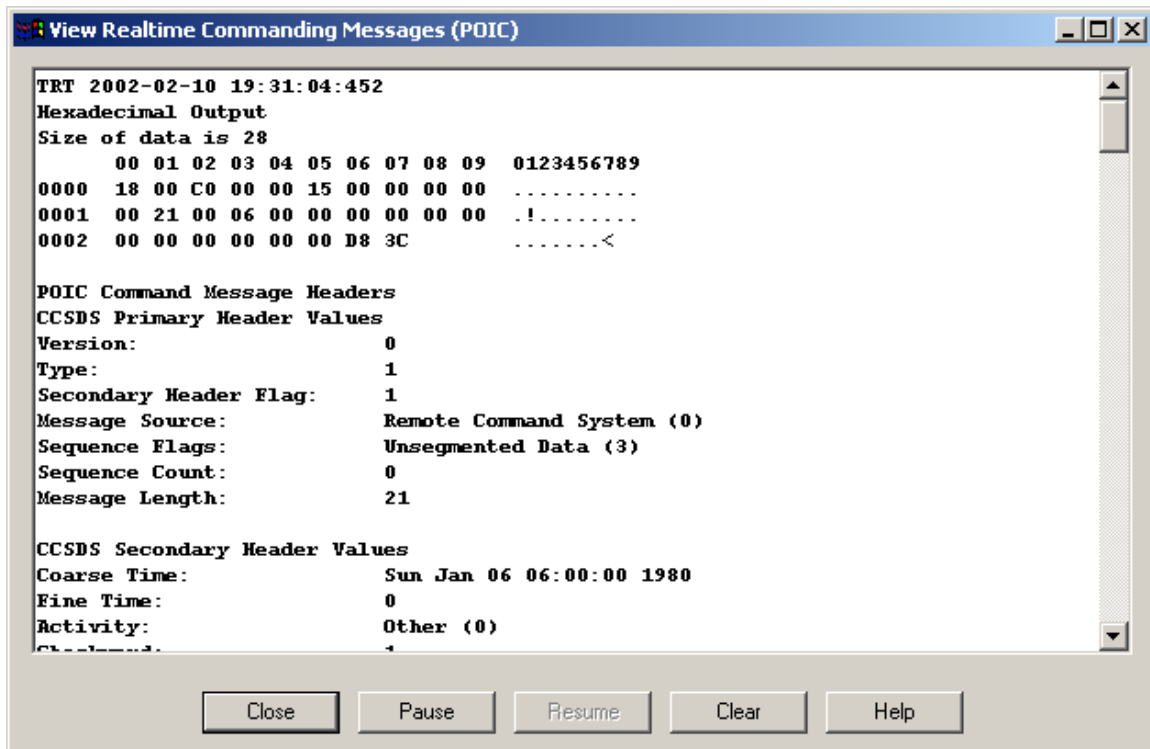
Figure 26 View Realtime Commanding Messages Dialog

This dialog displays the latest realtime commanding messages that were exchanged between TReK and the POIC command system. You can use the scrollbar to scroll through the messages to see the initial messages that are exchanged when a command session is established. Initially there are five messages that are exchanged between TReK and the POIC:

1. Connection Request Message
2. Successful Connection Message
3. Command System Configuration Message
4. Command System Status Message
5. Command Enable Status Message

The Command System Configuration Message and the Command System Status message are sent from the POIC to TReK. These messages provide information about the state of the POIC command system. This is how TReK gets the information that appears in the destination list for the POIC destination. For example, these messages contain information about Clear To Send, Remote Commanding, User Enablement, etc. The Command Enable Status message contains the list of commands that you are authorized to send. Since we logged in as Captain Kirk, we now have the list of commands that Captain Kirk is authorized to send.

The Realtime Viewers each use an underlying buffer to hold incoming messages. These buffers will wrap after so many messages. You can control the size of each buffer separately (one for the login session and one for the commanding session) by setting the Buffer Size information in the Add POIC Destination dialog.

Please push the **Close** button on each of the Realtime Viewer dialogs.

Now we're ready to move on to the next topic.

How to Uplink a Command and View Command Responses

6.4 How to Uplink a Command and View Command Responses

This section will show you how to uplink a command and view the command responses that are returned. If you have not performed the Step-By-Step procedure in section 6.2 please go back and do this before performing the steps below.

Step-By-Step

1. Go to the **Command Processing** application, select the **Command** menu, and then select the **Commands** menu item. This will display the Commands dialog shown in Figure 27.
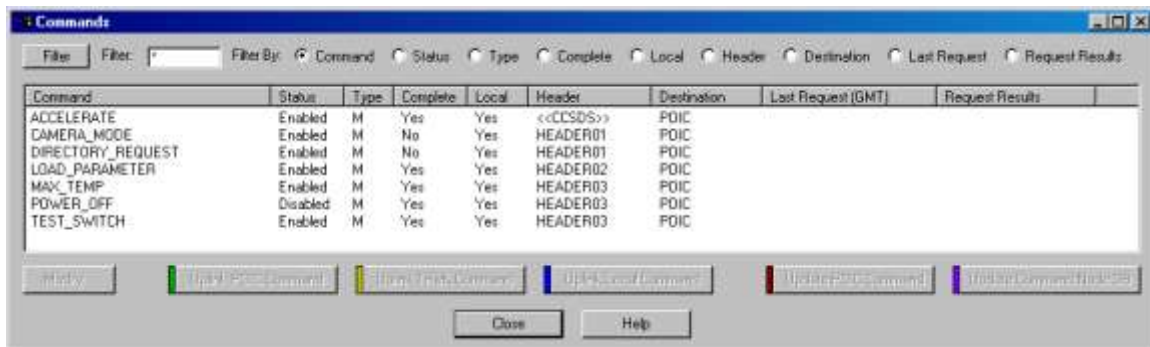
Figure 27 Commands Dialog

2. In the **Commands** dialog you will see the list of all the commands you are authorized to send. Select the **CAMERA_MODE** command and push the **Uplink POIC Command** button. This will uplink the command (send it to the Command Trainer application). Notice the Last Request and Request Results columns in the Commands dialog as shown in Figure 28. These columns have been updated with information about the results of your command uplink request.
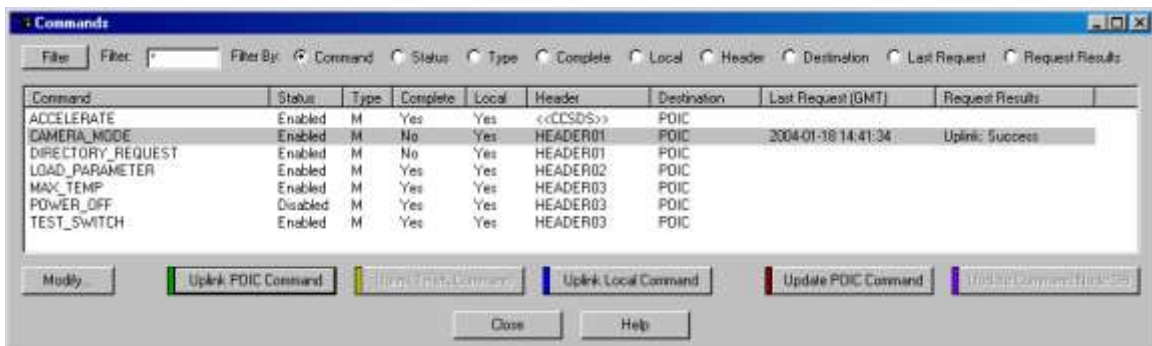
Figure 28 Results of Command Uplink Request

3. Push the **Close** button in the **Commands** dialog to close the **Commands** dialog.

4. Look at the middle area of the Command Processing Main Window (shown in Figure 29). This is called the Main Window Command Track area. You now see the CAMERA_MODE command in the command track list, along with the name of the destination where the command was sent, the command uplink time, and information about each command response that was received.
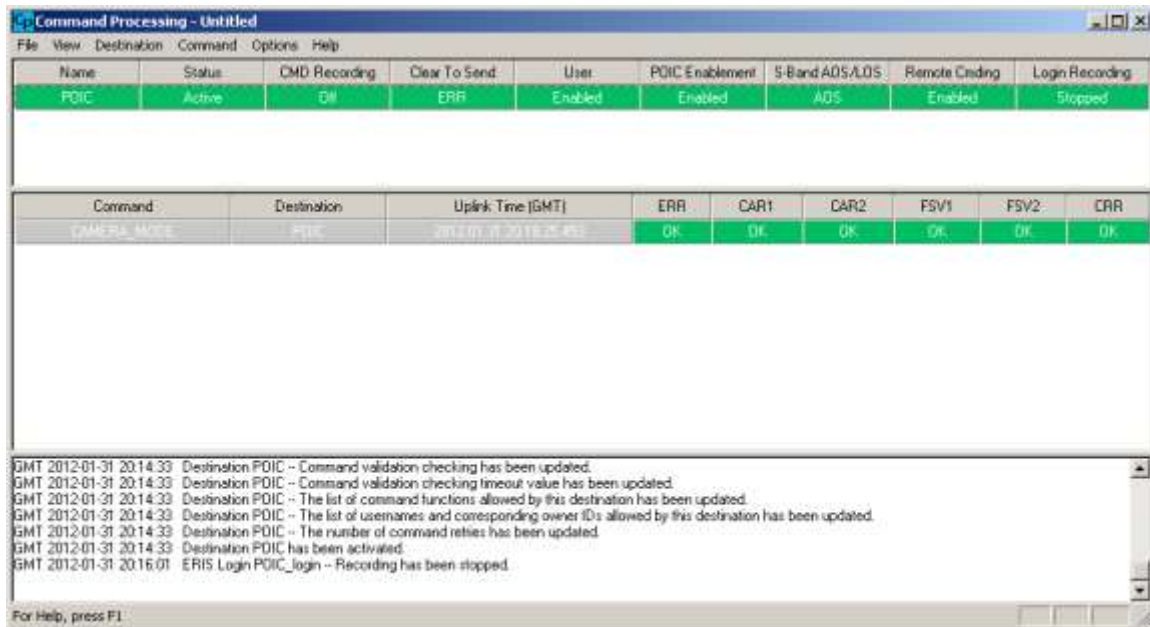
Figure 29 Command Response Information

5. Go to the **Command** menu and select the **Command Track** menu item. The dialog shown in Figure 30 will be displayed. This dialog shows the complete list of commands (and command responses) that have been sent from your TReK system. The Command Track area in the Command Processing main window is configured to show 5 commands at any one time. However, the Command Track dialog will show all commands sent unless you limit the list by using the filter. (Note: You can configure the Main Window Command Track area by using the Set Main Window Command Track Preferences option which is available from the View menu).
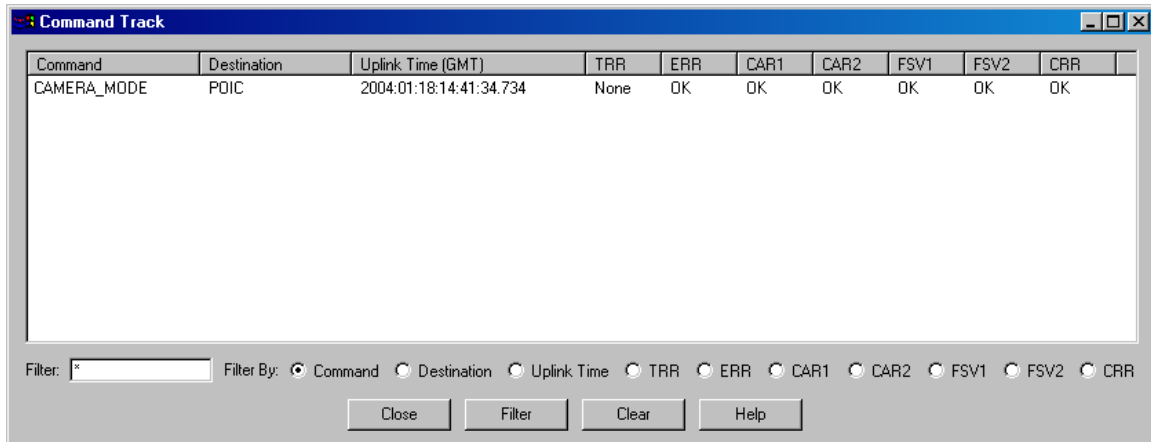
Figure 30 Command Track Dialog

Note: If you need information about command responses please reference the TReK Command Tutorial (TREK-USER-020) and/or the POIC to Generic User Interface Definition Document Volume II (SSP-50305).

Please push the **Close** button on the Command Track dialog.

How to Update a Command

6.5   How to Update a Command

This section will show you how to update a command. If you have not performed the Step-By-Step procedure in section 6.2 please go back and do this before performing the steps below.

Step-By-Step

1. Go to the **Command Processing** application, select the **Command** menu, and then select the **Commands** menu item. This will display the Commands dialog shown in Figure 31.
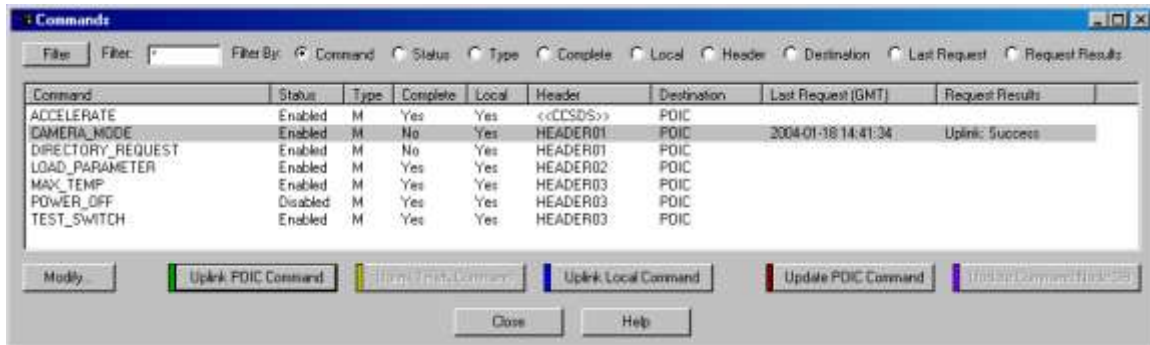
Figure 31 Commands Dialog

2. Select the **LOAD_PARAMETER** command and push the **Modify** button. The **Modify Command** dialog as shown in Figure 32 will be displayed. The Modify Command dialog can be used to update the properties associated with a command. The list at the bottom of the dialog contains all the command fields in the command.

Figure 32 Modify Command Dialog

3. Scroll through the list of command fields and look for the command field called **WORD03**. Notice that the **Type** column for this field is 'M'. This means the command field is modifiable. Select the **WORD03** command field and push the **Modify Field** button. The Modify Command Field dialog shown in Figure 33 will be displayed.

Figure 33 Modify Command Field Dialog

The Modify Command Field dialog provides a way to modify the properties associated with the command field. Move your cursor to the Field Value (Decimal) field and type in the number 5. Notice that as you type the other Field Value fields (Binary, Octal, etc.) update to show the value using the specified representation as shown in Figure 34.

Figure 34 Modify Command Field Value

4. Push the **OK** button to close the dialog. This will update the field value.

5. Push the **OK** button to close the **Modify Command** dialog.

6. Push the **Close** button to close the Commands dialog.

Congratulations! You now know how to update a command in the local TReK database. Please remember that this command has only been updated in the local TReK database. If you wanted to update this command in the POIC database, you would select the command in the Commands dialog and then push the Update POIC Command button. This would take the values from the local TReK database and send them to the POIC.

How to Use the Recorded Data Viewer

6.6   How to Use the Recorded Data Viewer.

This section will show you how to use the Recorded Data Viewer. The Recorded Data Viewer is used to view information stored in a TReK recording file. If you have not performed the Step-By-Step procedure in section 6.2 please go back and do this before performing the steps below. We will be using the eris recording file that was created in section 6.2.

Step-By-Step

1. Go to the **Command Processing** application, select the **Options** menu, and then select the **Recorded Data Viewer** menu item. This will display the Recorded Data Viewer dialog shown in Figure 35.
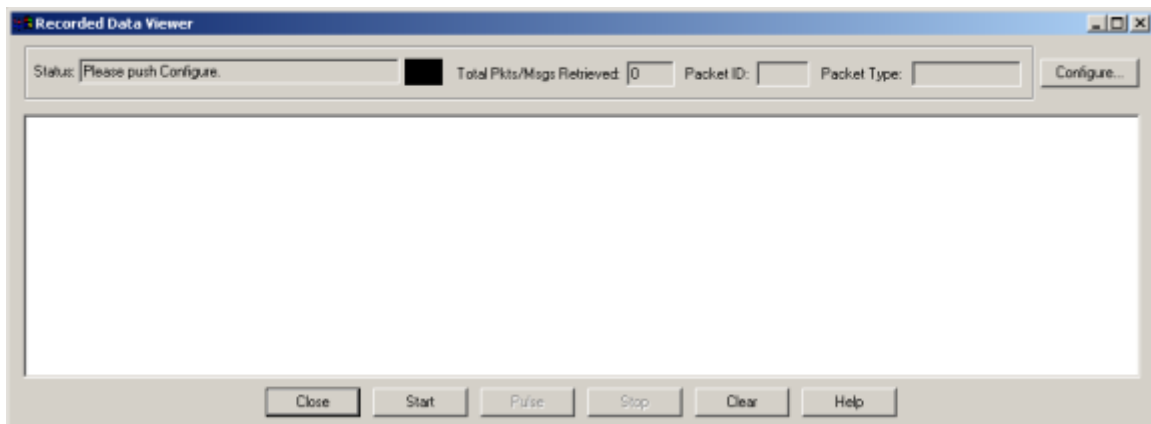
Figure 35 Recorded Data Viewer

2. In the **Recorded Data Viewer** dialog push the **Configure** button. The dialog shown in Figure 36 will be displayed.
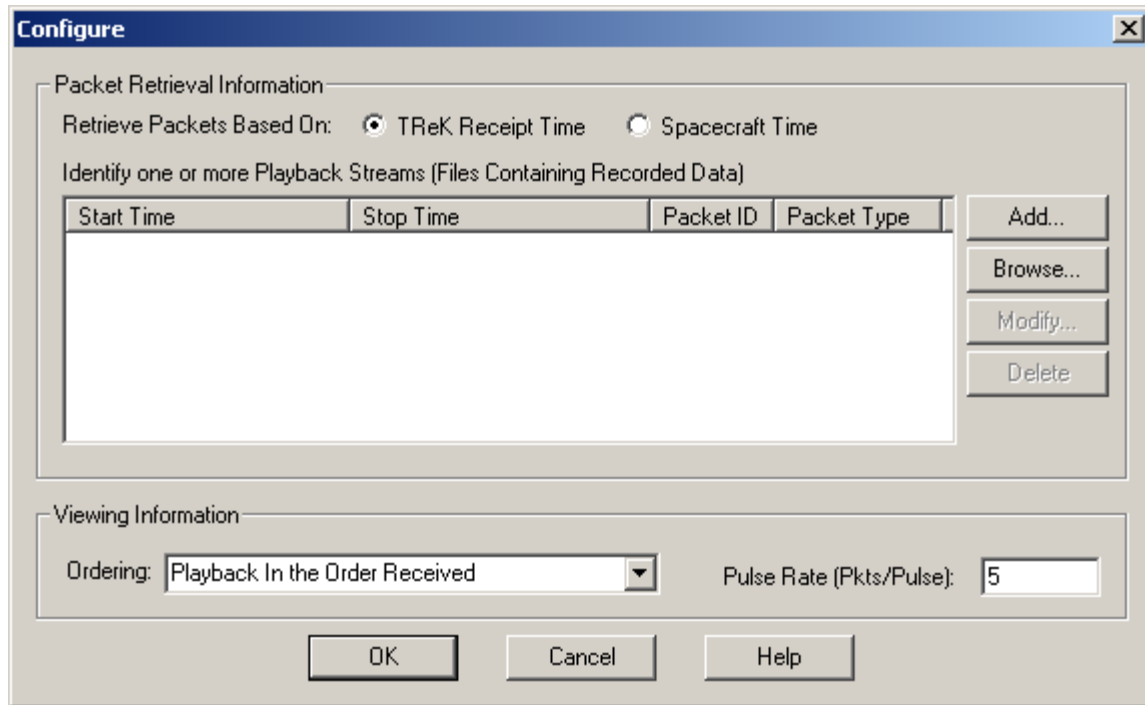
Figure 36 Configure (Recorded Data Viewer) Dialog

3. The Configure dialog is used to identify the data recording files to be viewed. Since the data recording file we will be using contains ERIS login data the "Retrieve Packets Based On" choice should be TReK Receipt Time (TRT). Spacecraft Time (SCT) is only valid for telemetry data. There are two ways to identify the data recording files. You can enter information that describes the data segment (start time, stop time, location, etc.) and TReK will search for that particular segment of data or you can identify the data files themselves. To identify the data segment you use the Add button. To identify a set of data recording files you use the Browse button. In this example we are going to use the Add button. Push the **Add** button. The Add dialog is shown in Figure 37.

Figure 37 Add Dialog

4. Enter the following information:

Start Time Year Field: 2003
Original Base File Name: eris
Original Recorded Data Directory: C:\

Remember the Original Recorded Data Directory should be the location where you stored the eris login recording file when you worked through section 6.2. Also, you don't have to enter the exact Start Time or exact Stop Time. You just need to identify a timeframe that includes the Start Time and Stop Time.

The updates are shown in Figure 38 below. It is okay if the Month, Day, Hour, Min, Sec, msec, fields in your dialog differ from those shown in Figure 38. These fields default to the current time. It is okay to leave those fields with the default values.

Figure 38 ERIS Login Recording File Information

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5. Push the **OK** button in the Add dialog.

6. In the **Configure** dialog note that the Pulse Rate defaults to 5. The Pulse Rate comes into play when you are viewing the data. When you push the Pulse button in the Recorded Data Viewer dialog, 5 ERIS login messages will be retrieved from the eris login recording file. Also, note that the Retrieve Packets Based On" radio buttons are now insensitive. Once you add something to the list, your TRT/SCT choice is set. If you add more files to the list, then these files should be retrieved based on the same retrieve type. If you delete everything from the list, then the radio buttons will become sensitive again. Push the **OK** button in the **Configure** dialog.

7. In the **Recorded Data Viewer** dialog push the **Start** button. Five ERIS login messages will be displayed as shown in Figure 39. To see another 5 messages push the **Pulse** button.
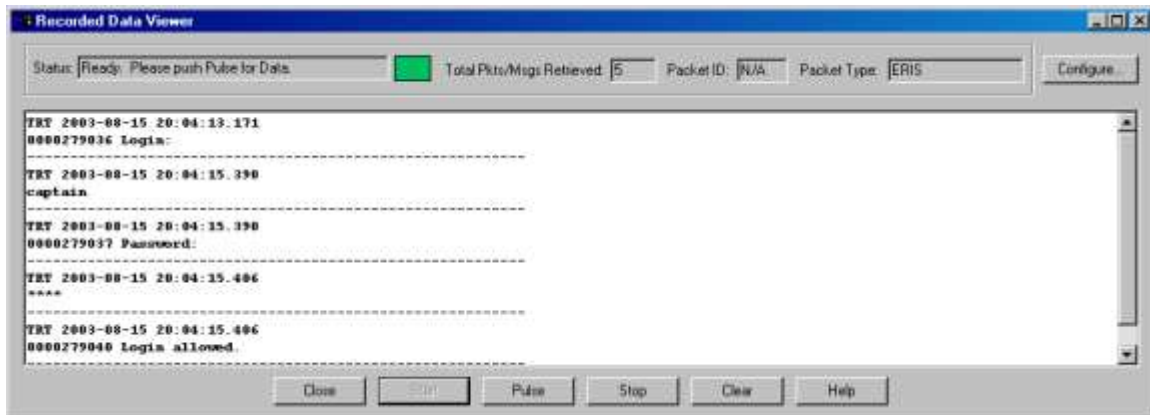
Figure 39 Recorded Data Viewer with ERIS login Data

When all the messages in the file have been retrieved the color block will turn red and the Status will change to "No More Data. Push Replay to Play Again." At this point you can replay what was in the file or you can re-configure the viewer to look at a different set of recording files.

Push the **Close** button to close the Recorded Data Viewer dialog.

In the Command Processing application, go to the **File** menu and select **Exit** to exit the Command Processing application. Select No when prompted to save changes.

In the Command Trainer application, go to the **File** menu and select **Exit** to exit the Command Trainer application. Select No when prompted to save changes.

Congratulations! You have completed the Command Applications Tutorial. Good luck with your commanding endeavors and please visit the Command Trainer and Command Processing User Guides if you need more information.

Appendix A Glossary

Note: This Glossary is global to all TReK documentation. All entries listed may not be referenced within this document.

Application Programming Interface (API)	A set of functions used by an application program to provide access to a system's capabilities.
Application Process Identifier (APID)	An 11-bit field in the CCSDS primary packet header that identifies the source-destination pair for ISS packets. The type bit in the primary header tells you whether the APID is a payload or system source-destination.
Calibration	The transformation of a parameter to a desired physical unit or text state code.
Communications Outage Recorder	System that captures and stores payload science, health and status, and ancillary data during TDRSS zone of exclusion.
Consultative Committee for Space Data Systems (CCSDS) format	Data formatted in accordance with recommendations or standards of the CCSDS.
Consultative Committee for Space Data Systems (CCSDS) packet	A source packet comprised of a 6-octet CCSDS defined primary header followed by an optional secondary header and source data, which together may not exceed 65535 octets.
Conversion	Transformation of downlinked spacecraft data types to ground system platform data types.
Custom Data Packet	A packet containing a subset of parameters that can be selected by the user at the time of request.
Cyclic Display Update Mode	A continuous update of parameters for a particular display.
Decommutation (Decom)	Extraction of a parameter from telemetry.
Discrete Values	Telemetry values that have states (e.g., on or off).

Dump	During periods when communications with the spacecraft are unavailable, data is recorded onboard and played back during the next period when communications resume. This data, as it is being recorded onboard, is encoded with an onboard embedded time and is referred to as dump data.
Enhanced HOSC System (EHS)	Upgraded support capabilities of the HOSC systems to provide multi-functional support for multiple projects. It incorporates all systems required to perform data acquisition and distribution, telemetry processing, command services, database services, mission support services, and system monitor and control services.
Exception Monitoring	A background process capable of continuously monitoring selected parameters for Limit or Expected State violations. Violation notification is provided through a text message.
Expected State Sensing	Process of detecting a text state code generator in an off-nominal state.
EXPRESS	An EXPRESS Rack is a standardized payload rack system that transports, stores and supports experiments aboard the International Space Station. EXPRESS stands for EXpedite the PRocessing of Experiments to the Space Station.
File transfer protocol (ftp)	Protocol to deliver file-structured information from one host to another.
Flight ancillary data	A set of selected core system data and payload health and status data collected by the USOS Payload MDM, used by experimenters to interpret payload experiment results.

Grayed out	Refers to a menu item that has been made insensitive, which is visually shown by making the menu text gray rather than black. Items that are grayed out are not currently available.
Greenwich Mean Time (GMT)	The solar time for the meridian passing through Greenwich, England. It is used as a basis for calculating time throughout most of the world.
Ground ancillary data	A set of selected core system data and payload health and status data collected by the POIC, which is used by experimenters to interpret payload experiment results. Ground Ancillary Data can also contain computed parameters (pseudos).
Ground receipt time	Time of packet origination. The time from the IRIG-B time signal received.
Ground Support Equipment (GSE)	GSE refers to equipment that is brought in by the user (i.e. equipment that is not provided by the POIC).
Ground Support Equipment Packet	A CCSDS Packet that contains data extracted from any of the data processed by the Supporting Facility and the format of the packet is defined in the Supporting Facility's telemetry database.
Huntsville Operations Support Center (HOSC)	A facility located at the Marshall Space Flight Center (MSFC) that provides scientists and engineers the tools necessary for monitoring, commanding, and controlling various elements of space vehicle, payload, and science experiments. Support consists of real-time operations planning and analysis, inter- and intra-center ground operations coordination, facility and data system resource planning and scheduling, data systems monitor and control operations, and data flow coordination.

IMAQ ASCII	A packet type that was added to TReK to support a very specific application related to NASA's Return to Flight activities. It is not applicable to ISS. It is used to interface with an infrared camera that communicates via ASCII data.
Limit Sensing	Process of detecting caution and warning conditions for a parameter with a numerical value.
Line Outage Recorder Playback	A capability provided by White Sands Complex (WSC) to play back tapes generated at WSC during ground system communication outages.
Measurement Stimulus Identifier (MSID)	Equivalent to a parameter.
Monitoring	A parameter value is checked for sensing violations. A message is generated if the value is out of limits or out of an expected state.
Parameter	TReK uses the generic term parameter to mean any piece of data within a packet. Sometimes called a measurement or MSID in POIC terminology.
Payload Data Library (PDL)	An application that provides the interface for the user to specify which capabilities and requirements are needed to command and control his payload.
Payload Data Services Systems (PDSS)	The data distribution system for ISS. Able to route data based upon user to any of a number of destinations.
Payload Health and Status Data	Information originating at a payload that reveals the payload's operational condition, resource usage, and its safety/anomaly conditions that could result in damage to the payload, its environment or the crew.
Payload Operations Integration Center (POIC)	Manages the execution of on-orbit ISS payloads and payload support systems in coordination/unison with distributed International Partner Payload Control Centers, Telescience Support Centers (TSC's) and payload-unique remote facilities.

Payload Rack Checkout Unit (PRCU)

The Payload Rack Checkout Unit is used to verify payload to International Space Station interfaces for U.S. Payloads.

Playback

Data retrieved from some recording medium and transmitted to one or more users.

Pseudo Telemetry (pseudo data)

Values that are created from calculations instead of directly transported telemetry data. This pseudo data can be created from computations or scripts and can be displayed on the local PC.

Remotely Generated Command

A command sent by a remote user whose content is in a raw bit pattern format. The commands differ from predefined or modifiable commands in that the content is not stored in the POIC Project Command Database (PCDB).

Science data

Sensor or computational data generated by payloads for the purpose of conducting scientific experiments.

Subset

A collection of parameters from the total parameter set that is bounded as an integer number of octets but does not constitute the packet itself. A mini-packet.

Super sampled

A parameter is super sampled if it occurs more than once in a packet.

Swap Type

A flag in the Parameter Table of the TReK database that indicates if the specified datatype is byte swapped (B), word swapped (W), byte and word swapped (X), byte reversal (R), word reversal (V) or has no swapping (N).

Switching

A parameter's value can be used to switch between different calibration and sensing sets. There are two types of switching on TReK: range and state code.

Transmission Control Protocol (TCP)	TCP is a connection-oriented protocol that guarantees delivery of data.
Transmission Control Protocol (TCP) Client	A TCP Client initiates the TCP connection to connect to the other party.
Transmission Control Protocol (TCP) Server	A TCP Server waits for (and accepts connections from) the other party.
Telemetry	Transmission of data collected form a source in space to a ground support facility. Telemetry is downlink only.
Telescience Support Center (TSC)	A TSC is a NASA funded facility that provides the capability to plan and operate on-orbit facility class payloads and experiments, other payloads and experiments, and instruments.
User Application	Any end-user developed software program that uses the TReK Application Programming Interface software. Used synonymously with User Product.
User Data Summary Message (UDSM)	Packet type sent by PDSS that contains information on the number of packets sent during a given time frame for a PDSS Payload packet. For details on UDSM packets, see the POIC to Generic User IDD (SSP-50305).
Uplink format	The bit pattern of the command or file uplinked.
User Datagram Protocol (UDP)	UDP is a connection-less oriented protocol that does not guarantee delivery of data. In the TCP/IP protocol suite, the UDP provides the primary mechanism that application programs use to send datagrams to other application programs. In addition to the data sent, each UDP message contains both a destination port number and a fully qualified source and destination addresses making it possible for the UDP software on the destination to deliver the message to the correct recipient process and for the recipient process to send a reply.

User Product

Any end-user developed software program that uses the TReK Application Programming Interface software. Used synonymously with User Application.

Web

Term used to indicate access via HTTP protocol; also referred to as the World Wide Web (WWW).

Appendix B Acronyms

Note: This acronym list is global to all TReK documentation. Some acronyms listed may not be referenced within this document.

AOS	Acquisition of Signal
API	Application Programming Interface
APID	Application Process Identifier
ASCII	American Standard Code for Information Interchange
CAR	Command Acceptance Response
CAR1	First Command Acceptance Response
CAR2	Second Command Acceptance Response
CCSDS	Consultative Committee for Space Data Systems
CDB	Command Database
CDP	Custom Data Packet
COR	Communication Outage Recorder
COTS	Commercial-off-the-shelf
CRR	Command Reaction Response
DSM	Data Storage Manager
EHS	Enhanced Huntsville Operations Support Center (HOSC)
ERIS	EHS Remote Interface System
ERR	EHS Receipt Response
EXPRESS	Expediting the Process of Experiments to the Space Station
ES	Expected State
FAQ	Frequently Asked Question
FDP	Functionally Distributed Processor
FSV	Flight System Verifier
FSV1	First Flight System Verifier
FSV2	Second Flight System Verifier
FPD	Flight Projects Directorate
FTP	File Transfer Protocol
GMT	Greenwich Mean Time
GRT	Ground Receipt Time
GSE	Ground Support Equipment
HOSC	Huntsville Operations Support Center
ICD	Interface Control Document
IMAQ ASCII	Image Acquisition ASCII
IP	Internet Protocol
ISS	International Space Station
LDP	Logical Data Path
LES	Limit/Expected State
LOR	Line Outage Recorder
LOS	Loss of Signal
MCC-H	Mission Control Center – Houston
MOP	Mission, Operational Support Mode, and Project
MSFC	Marshall Space Flight Center

MSID	Measurement Stimulus Identifier
NASA	National Aeronautics and Space Administration
OCDB	Operational Command Database
OS	Operating System
PC	Personal Computer, also Polynomial Coefficient
PCDB	POIC Project Command Database
PDL	Payload Data Library
PDSS	Payload Data Services System
PGUIDD	POIC to Generic User Interface Definition Document
POIC	Payload Operations Integration Center
PP	Point Pair
PRCU	Payload Rack Checkout Unit
PSIV	Payload Software Integration and Verification
RPSM	Retrieval Processing Summary Message
SC	State Code
SCS	Suitcase Simulator
SSP	Space Station Program
SSCC	Space Station Control Center
SSPF	Space Station Processing Facility
TCP	Transmission Control Protocol
TReK	Telescience Resource Kit
TRR	TReK Receipt Response
TSC	Telescience Support Center
UDP	User Datagram Protocol
UDSM	User Data Summary Message
URL	Uniform Resource Locator
USOS	United States On-Orbit Segment
VCDU	Virtual Channel Data Unit
VCR	Video Cassette Recorder
VPN	Virtual Private Network